

**FOR YOUR SAFETY***If you smell gas:*

1. Open windows.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Leave the building.
6. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
7. If you cannot reach your gas supplier, call the Fire Department.

**⚠ WARNING****Fire Hazard**

**Do not store or use petrol or other flammable vapours and liquids in the vicinity of this or any other appliance.**

**Some objects will catch fire or explode when placed close to heater.**

**Failure to follow these instructions can result in death, injury or property damage.**

**RG ROBERTS GORDON®****DualAir®**

# Heating and Cooling Units Installation, Commissioning, Operation & Service Manual

**DAT75  
DAT90  
DAT100  
DAT115****⚠ WARNING**

**Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the installation, operation and service manual thoroughly before installing or servicing this equipment.**

**Installation must be done by a registered installer/contractor qualified in the installation and service of gas-fired heating equipment or your gas supplier.**

*Quality in Any Language™*

© Copyright 2007 Roberts-Gordon, LLC

**Installer**

Please take the time to read and understand these instructions prior to any installation.

Installer must give a copy of this manual to the owner.

**Owner**

Keep this manual in a safe place in order to provide your serviceman with necessary information.

**Roberts-Gordon Europe Limited**

Unit A, Kings Hill Business Park  
Darlaston Road, Wednesbury  
West Midlands WS10 7SH UK  
Telephone: +44 (0)121 506 7700  
Fax: +44 (0)121 506 7701  
Service Telephone: +44 (0)190 249 8733  
Service Fax: +44(0)190 240 1464  
E-mail: uksales@rg-inc.com  
E-mail: export@rg-inc.com  
[www.rg-inc.com](http://www.rg-inc.com)

P/N X527 Rev C 10/07



---

## TABLE OF CONTENTS

<b>SECTION 1: Heater Safety.....</b>	<b>2</b>	<b>SECTION 12: User Instructions.....</b>	<b>25</b>
<b>SECTION 2: Installer Responsibility .....</b>	<b>2</b>	12.1 User Instructions .....	25
2.1 Clearances to Combustibles .....	2	12.2 Heater Operation.....	25
2.2 Corrosive Chemicals.....	2	12.3 Common User Controls.....	25
2.3 National Standards and Applicable Codes .....	2	12.4 Cooling Section Operation .....	26
<b>SECTION 3: Critical Considerations .....</b>	<b>3</b>	12.5 Heating Section Lighting Instructions.....	26
3.1 Basic Information.....	3	12.6 Simple Fault Finding.....	26
3.2 Location and Suspension .....	3	<b>SECTION 13: Servicing.....</b>	<b>28</b>
3.3 Minimum Required Installation Clearances .....	3	13.1 Servicing Instructions.....	28
3.4 Clearances to Combustibles .....	3	13.2 Burner Maintenance.....	28
3.5 Ventilation .....	3	13.3 Fan/Motor Assembly Maintenance .....	28
3.6 Gas Supply .....	3	13.4 Heat Exchanger Maintenance .....	28
3.7 Electrical Supply .....	3	13.5 Gas Control Valve Maintenance .....	29
3.8 Flue.....	3	13.6 Flue Fan .....	29
3.9 Coil Condense Drain.....	3	<b>SECTION 14: Conversion Between Gases .....</b>	<b>30</b>
<b>SECTION 4: Specifications .....</b>	<b>5</b>	14.1 General .....	30
4.1 DAT .....	5	14.2 Burner Conversion .....	30
4.2 General Technical Data Table .....	6	14.3 Gas Valves .....	30
4.3 Technical Data Table - Heater Section.....	7	<b>SECTION 15: Troubleshooting .....</b>	<b>31</b>
4.4 DualAir® Performance Data - Graph of Air Flows v Static Pressure.....	8	15.1 General .....	31
<b>SECTION 5: Heater Installation.....</b>	<b>9</b>	15.2 Troubleshooting For Automatic Ignition Burner Systems .....	32
5.1 General .....	9	15.3 Troubleshooting for Flame Supervision System .....	33
5.2 Handling .....	9	15.4 Troubleshooting for Solenoid Valves .....	34
5.3 Shelf Mounting and Suspension .....	9	15.5 Troubleshooting for Main Fan .....	34
<b>SECTION 6: Flue Installation .....</b>	<b>10</b>	15.6 Troubleshooting for Fan Contactor .....	35
6.1 Flue Installation.....	10	<b>SECTION 16: Removal and Replacement Parts.....</b>	<b>36</b>
6.2 Type C <sub>12</sub> , C <sub>32</sub> & C <sub>62</sub> Appliance .....	10	16.1 Gas Valve .....	36
6.3 Type B <sub>22</sub> Appliance.....	10	16.2 Burner Compartment .....	37
6.4 Converting from Top to Side Terminations for Flue and Air Intake .....	10	16.3 Ignition Electrode and Flame Probe .....	38
<b>SECTION 7: Air Supply.....</b>	<b>13</b>	16.4 Flue Fan .....	39
7.1 Room Sealed Installation .....	13	16.5 Heater Pressure Switch .....	40
7.2 Open Flued Installation .....	13	16.6 Cooling Coil Safety Devices .....	41
7.3 Building Ventilation .....	13	16.7 Ignition Control .....	42
7.4 Isolated Equipment Rooms .....	13	16.8 Fan Motor Removal .....	42
<b>SECTION 8: Optional Heater Configurations.....</b>	<b>14</b>	16.9 Combination Fan/Limit Thermostat .....	43
8.1 Distribution Duct .....	14		
<b>SECTION 9: Gas Piping .....</b>	<b>15</b>		
9.1 Connections.....	15		
<b>SECTION 10: Wiring and Electrical Information.....</b>	<b>16</b>		
10.1 Electrical Supply .....	16		
10.2 Remote Control .....	16		
10.3 DAT Main Circuit Board Terminal Identification .....	17		
10.4 DAT Wiring Diagram.....	18		
10.5 DAT Wiring Diagram.....	19		
10.6 DAT Site Connections at Main Circuit Board.....	20		
<b>SECTION 11: Commissioning .....</b>	<b>21</b>		
11.1 Pre-Commission Checks .....	21		
11.2 Gas Supply .....	21		
11.3 Mechanical Checks.....	21		
11.4 Begin Commissioning .....	21		
11.5 Combustion Testing .....	23		
11.6 Turning Off the DualAir® Unit .....	24		
11.7 External Controls .....	24		
11.8 Complete the Commissioning .....	24		
11.9 Instruction to the User .....	24		

© 2007 Roberts-Gordon, LLC

All rights reserved. No part of this work covered by the copyrights herein may be reproduced or copied in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping or information storage and retrieval systems - without the written permission of Roberts-Gordon, LLC.



---

## TABLE OF FIGURES

Figure 1: Condense Drain .....	3
Figure 2: Installation Clearances and Clearances to Combustibles .....	4
Figure 3: Suspension Methods .....	9
Figure 4: Flue and Roof Detail .....	10
Figure 5: Control Section & Upper Panel .....	11
Figure 6: Alternate .....	11
Figure 7: Vertical and Horizontal Flue Termination - Type B <sub>22</sub> Appliance .....	12
Figure 8: Vertical and Horizontal Flue Termination - Type C <sub>12</sub> C <sub>32</sub> & C <sub>62</sub> Appliances .....	12
Figure 9: DualAir® Units Installed in Isolated Equipment Rooms.....	13
Figure 10: Ducting.....	14
Figure 11: Gas Connection with Stainless Steel Flex Connector .....	15
Figure 12: Automatic Burner Control Box Sequence.....	22
Figure 13: Modureg Gas Valve.....	22
Figure 14: Heater Operating Sequence .....	25
Figure 15: Fan/Limit Thermostat .....	25
Figure 16: Belt Tension .....	28
Figure 17: Standard Regulator Removal .....	36
Figure 18: Cooling Coil Safety Devices.....	41
Figure 19: Combination Fan/Limit Thermostat .....	44



---

## **Product Approval**

ROBERTS GORDON® appliances have been tested and CE certified as complying with the essential requirements of the Gas Appliance Directive, the Low Voltage Directive, the Electromagnetic Compatibility Directive and the Machinery Directive for use on natural gas and LPG when installed, commissioned and maintained in accordance with these instructions.

These instructions refer to appliances designed to operate in the European Union.

Appliances designed for other countries (Non-European Union) are available on request.

This appliance must be installed in accordance with the local and national codes in force and used only in a sufficiently ventilated space, as specified in these instructions.

Before installation, check that the local gas distribution systems, nature of gas and pressure, and adjustment of the appliance are compatible.

## SECTION 1: HEATER SAFETY



Your Safety is Important to Us!  
This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

Installation, service and annual inspection of the DualAir® unit must be done by a registered installer/contractor qualified in the installation and service of gas-fired heating equipment.

Read this manual carefully before installation, operation, or service of this equipment.

This DualAir® unit is designed for heating and cooling non-residential indoor spaces. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to gas piping, electrical wiring, venting, refrigerant installation, etc. must be thoroughly understood before proceeding with the installation.

## SECTION 2: INSTALLER RESPONSIBILITY

- To supply and install a suitable condenser unit along with associated refrigerant circuits in accordance with the requirements of all relevant local and national codes.
- To install the DualAir® unit, as well as the gas and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon recommends the installer contact a local building inspector, Fire Officer or insurance company for guidance.
- To use the information given in the manual together with the local and national codes to perform the installation.
- To install the DualAir® unit in accordance with the clearances to combustibles of this DualAir® unit.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports, flues and air intakes.
- To provide access for servicing.
- To provide the owner with a copy of this Installation, Commissioning, Operation and Service Manual.
- To never use the DualAir® unit as support for ladder or other access equipment and never hang or suspend anything from heater.
- To ensure that there is sufficient ventilation in the area to comply with the requirements of all relevant local and national codes.

### 2.1 Clearances to Combustibles

In all situations, clearances to combustibles must be maintained. Caution must be used when running the DualAir® unit near combustible materials such as wood, paper, rubber, etc. A wall tag (P/N 91040089) is on the back cover of this manual as a permanent reminder of the safety instructions and the importance of the required clearances to combustibles. Affix the tag on a wall near the DualAir® unit.

### 2.2 Corrosive Chemicals

#### **! CAUTION**

**Do not use heater in an area containing corrosive chemicals.**

**Corrosive chemicals will damage the burner and heat exchanger parts.**

**Failure to follow these instructions can result in property damage.**

Roberts-Gordon cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons\* anywhere in the premises.

\* **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the lifespan of the DualAir® unit components will be greatly reduced. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.

### 2.3 National Standards and Applicable Codes

All appliances must be installed in accordance with the latest revision of applicable standards and local and national codes. This refers also to the electric, gas, refrigerant and venting installation. Note: Additional standards for installations in public garages, aircraft hangars, etc. may be applicable.

## SECTION 3: CRITICAL CONSIDERATIONS

### 3.1 Basic Information

The CTUD heater that forms the heating section of the DualAir® unit has an automatic ignition burner and may be operated as fully modulating or ON/OFF operation.

The standard unit has the air flow from left to right when viewed from the controls side.

A special order version with the opposite air flow is available where the combustion air intake and flue will be at the front of the unit.

### 3.2 Location and Suspension

All models:

- Must be installed indoors.
- Must be installed in a level position.
- May be mounted on the floor or on a shelf of non-combustible material. (See Page 5, Section 4 and Page 9, Figure 3 for support points)
- May be suspended from above (See Page 9, Figure 3), on the floor, or from wall brackets of sufficient strength to support the DualAir® unit as listed in the Dimension Data Table on Page 6, Section 4.2. Drop rods must be a minimum of 12 mm diameter mild steel. Six suspension points are located on top of the DualAir® unit.
- Must be installed in a manner which allows the hinged door to be fully opened to provide access to all serviceable components.

### 3.3 Minimum Required Installation Clearances

Clearances around the DualAir® unit and flue must be as indicated on Page 4, Figure 2, Page 10, Figure 4 through Page 12, Figure 8 to ensure access for servicing, and correct operation.

### 3.4 Clearances to Combustibles

Clearances must be as indicated on Page 4, Figure 2. If no clearances to combustibles are indicated, then installation clearances apply.

### 3.5 Ventilation

It is important to ensure that there is adequate air circulation around the DualAir® unit to supply air for combustion, ventilation and distribution in accordance with local and national codes.

### 3.6 Gas Supply

It is important that the gas supply pipe is sized correctly to provide the inlet pressure as stated on the heater data plate. The gas supply pipe and electrical connections must not support any of the heater's weight.

### 3.7 Electrical Supply

A permanent 400v 3Ø 50Hz electrical supply is required at the main electrical terminals. The heater also requires suitable energy controls in accordance with Section 10.

### 3.8 Flue

Choose a location to allow for the proper alignment of the flue. Each DualAir® unit must be fitted with an individual and correctly sized sealed flue system (See Page 10, Section 6).

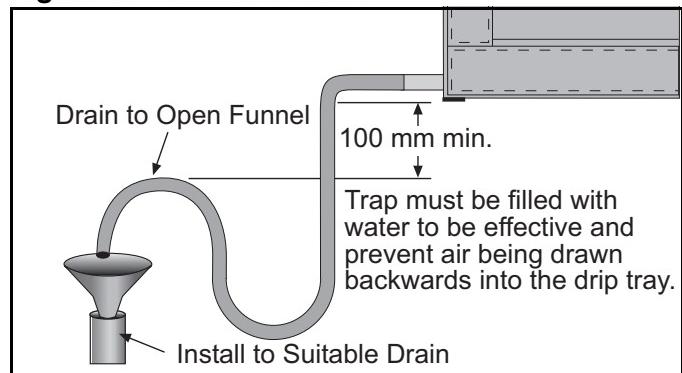
No other appliance may be connected to the flue.

For room-sealed installation, the air intake must be the same size sealed system and the flue/air intake must terminate at an approved concentric wall or roof terminal.

### 3.9 Coil Condense Drain

The cooling coil must be fitted with a suitable condense drain. The condense pipe work should be in plastic or copper piping in accordance with the latest revision of applicable standards and local and national codes.

**Figure 1: Condense Drain**



Failure to install the condense drain correctly may cause water carry over into the fan compartment, which may then escape and cause property damage.

## ⚠ WARNING



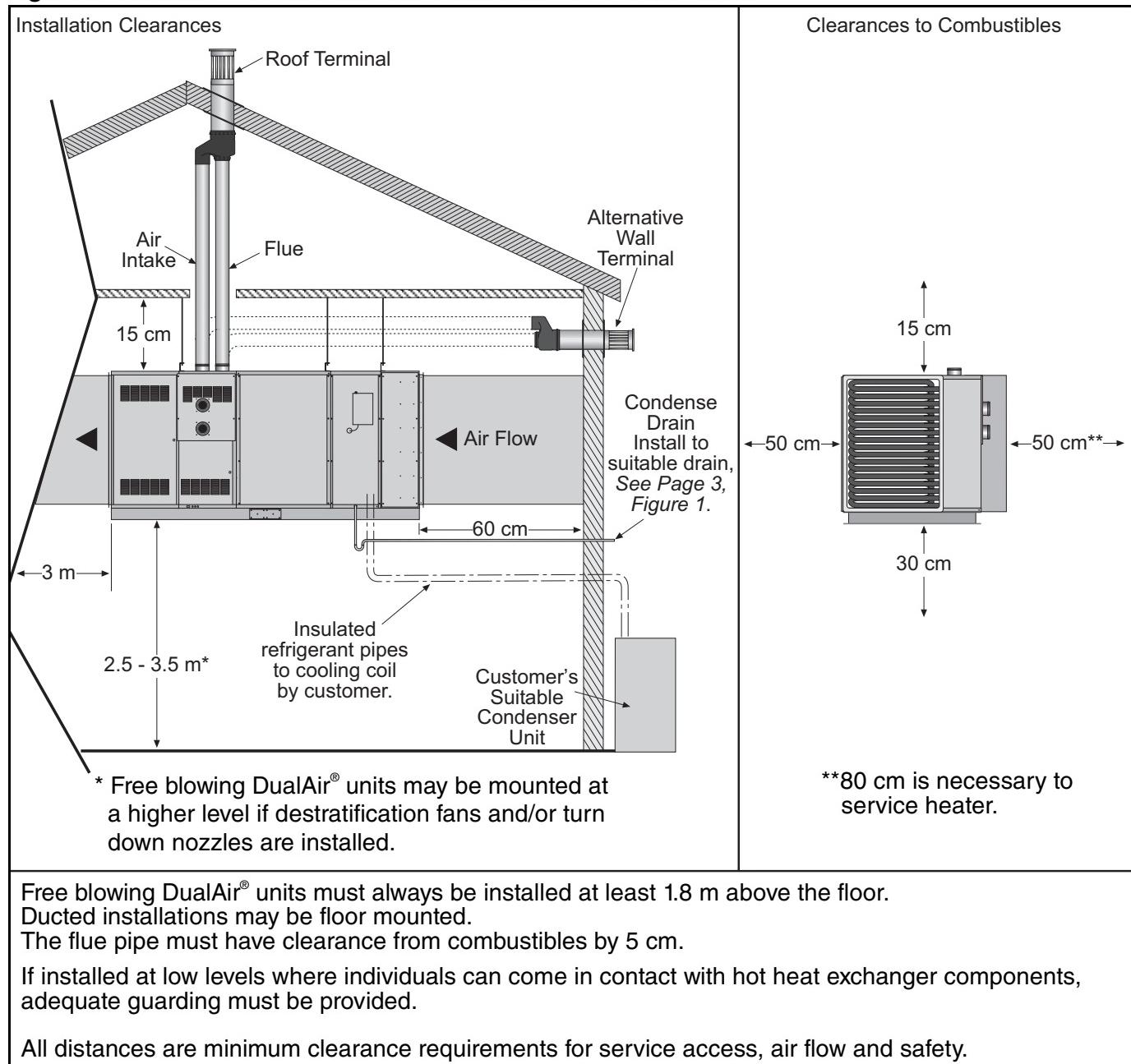
### Fire Hazard

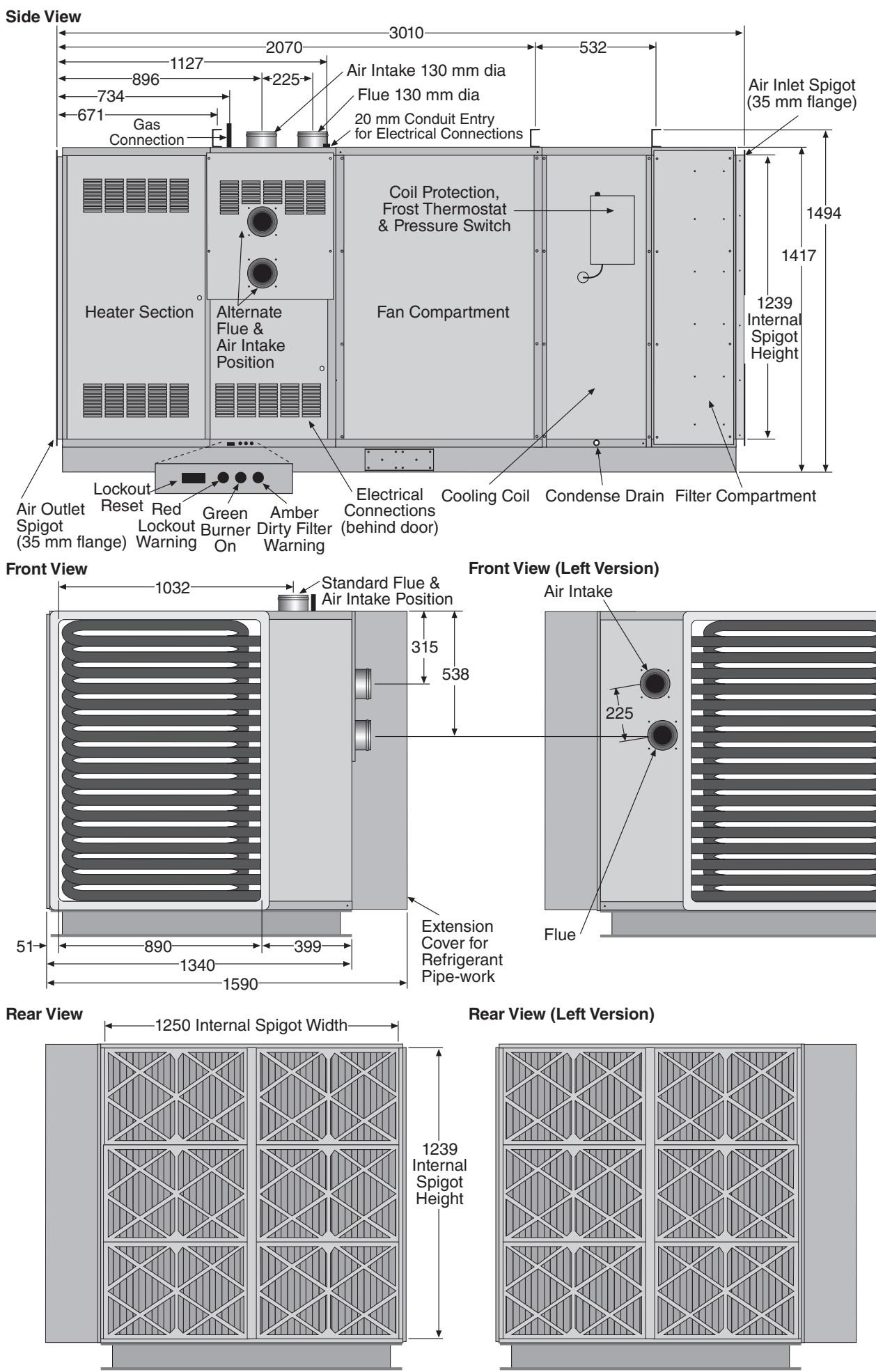
Some objects will catch fire or explode when placed close to heater.

Keep all flammable objects, liquids and vapours the required distance away from the heater.

Failure to follow these instructions can result in death, injury or property damage.

**Figure 2: Installation Clearances and Clearances to Combustibles**



**SECTION 4: SPECIFICATIONS****4.1 DAT**

**4.2 General Technical Data Table**

	<b>Model</b>	<b>75</b>	<b>90</b>	<b>100</b>	<b>115</b>
<b>Fan Data</b>					
Designed Air Flow # with Clean Filters	m <sup>3</sup> /sec	2.88		3.7	
Min Air Flow at Coil	m <sup>3</sup> /sec	1.66		2.60	
Max Air Flow at Coil	m <sup>3</sup> /sec	3.71		5.34	
Fan Unit		457-486 Double Inlet Belt Drive			
Fan Pulley	mm PCD	2A x 180 / 2A x 200		2A x 180	
Motor Pulley	mm PCD	2A x 100 / 2A x 95		2A x 112 / 2A x 118	
Vee Belts		2 x A 63		2 x A 64	
<b>Electrical Data - All models need 400v 50Hz 3N supply. Single phase supply output for control circuit 230v 50Hz fused at 5 Amp. All alarm and status signals 230v 50Hz. Modulation input 0-10vDC.</b>					
Total Electrical Load	kW	3.3		5.4	
Motor Size	kW	2.2		4.0	
Full Load Current	A	4.45		7.5	
Run Current at Designed Air Flow #	A	4.0 / 4.5		7.0 / 7.5	
Start Current	A	23.0		24.0	
<b>Cooling Coil - DX</b>					
Max Cooling Load Split into Two Equal Circuits	kW	57.74		71.54	
Inlet Connection	in	7/8 copper			
Outlet Connection	in	1 3/8 copper		1 5/8 copper	
Condensate Connection	ISO 7-R		1		
Refrigerant		R407C			
Design Temp. ON	°C Dry Bulb	27		25	
	°C Wet Bulb	19.4		18.07	
Design Temp. OFF	°C Dry Bulb	14.66		13	
	°C Wet Bulb	13.72		12.3	
<b>Filters - All Models</b>					
All Models		Qty. 6 - Farr 30/30 grade 100 x 635 x 406			
Initial Pressure Loss	mbar	0.4			
Max. Recommended Pressure Loss	mbar	1.5			
<b>Physical Data</b>					
Weight	kg	612	621	638	647
Noise from Cabinet at 1 m	NR dB(A)	65		72	
	SPL dB(A)	68		67.5	
Noise from Air Inlet at 1 m	NR dB(A)	68		77	
	SPL dB(A)	73		75	
Noise from Air Outlet at 1 m	NR dB(A)	75		81	
	SPL dB(A)	76		77	

Electrical load at 230v 50Hz measured by calculating from total run current of appliance.

\* Do not exceed the maximum length of flue stated or heater may not operate properly.

Reduce the maximum length stated by 1 m for each 90° bend installed.

\*\*If minimum air flow requirements are not met then temperature limit devices will shut down the heater.

**4.3 Technical Data Table - Heater Section**

Appliance Category II 2H/L 3B/P

	<b>Model</b>	<b>75</b>	<b>90</b>	<b>100</b>	<b>115</b>
Heat Input	kW	95	111	119	134
Gross Calorific Value	Btu/h x 1000	324	379	406	457
Heat Input	kW	86	100	107	121
Net Calorific Value	Btu/h x 1000	293	341	365	413
Approximate	kW	78	91	98	111
Max Heat Output	Btu/h x 1000	266	311	334	379
Min Heat Input - Low Fire	kW	66.5	77.7	83.3	93.8
Gross Calorific Value	Btu/h x 1000	227	265	284	320
Min Heat Input - Low Fire	kW	60.2	70	74.9	84.7
Net Calorific Value	Btu/h x 1000	205	239	256	289
Min Heat Output - Low Fire	kW	54.6	63.7	68.6	77.7
	Btu/h x 1000	186	217	234	265

**\*Combination Fan/Limit Thermostat Settings**

Set Point 1 Fan OFF Temp.	°C	30		
Set Point 2 Fan ON Temp.	°C	50	45	45
Set Point 3 Limit Temp.	°C	85	70	75
Secondary Limit Thermostat	°C			75

**Natural Gas (G20) Data - Inlet Pressure 20 mbar** Min 17 mbar Max 25 mbar

Max Burner Pressure	mbar	6.6	6.0	6.2	6.3
Max Gas Flow Rate	m <sup>3</sup> /h ft <sup>3</sup> /h	9.0 319	10.5 371	11.3 398	12.8 451
Min Burner Pressure - Low Fire	mbar	3.23	2.9	3.0	3.1
Min Gas Flow Rate	m <sup>3</sup> /h ft <sup>3</sup> /h	6.30 222.5	7.4 259.6	7.9 279.3	9.0 316.4

**Natural Gas (G25) Data - Inlet Pressure 25 mbar** Min 20 mbar Max 30 mbar

Max Burner Pressure	mbar	10.0	9.3	9.2	10.2
Max Gas Flow Rate	m <sup>3</sup> /h ft <sup>3</sup> /h	9.49 335.1	11.06 391	11.86 419	13.43 474
Min Burner Pressure - Low Fire	mbar	4.9	4.6	4.5	5.0
Min Gas Flow Rate	m <sup>3</sup> /h ft <sup>3</sup> /h	6.64 234.6	7.74 273.4	8.30 293.2	9.40 332.0

**LPG Gas Propane (G31) Data - Inlet Pressure 37 mbar (Alternative where permitted 50 mbar)** Minimum 25 mbar Maximum 57.5 mbar

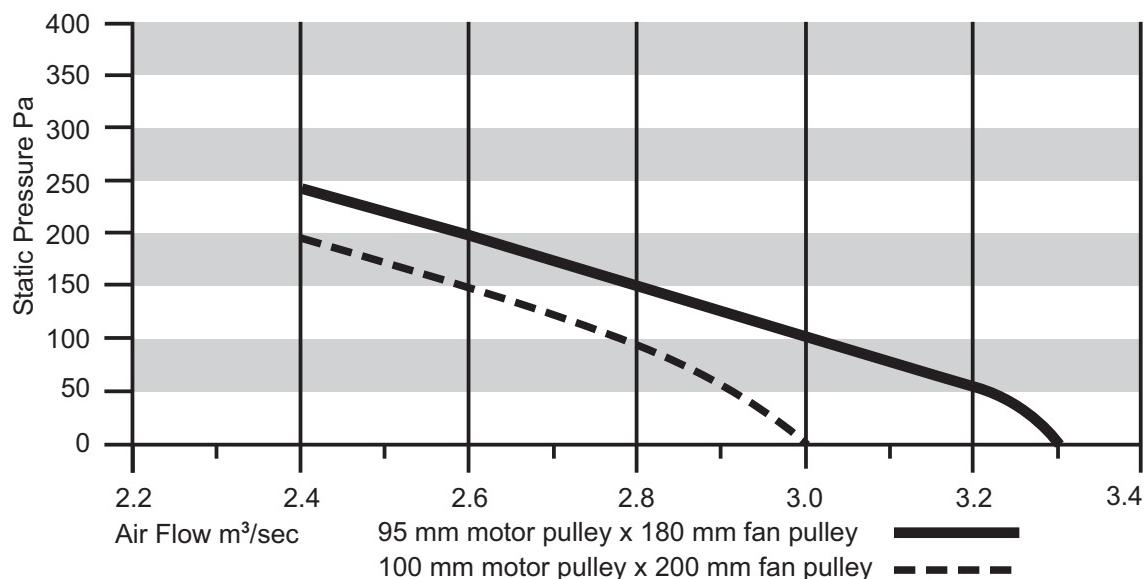
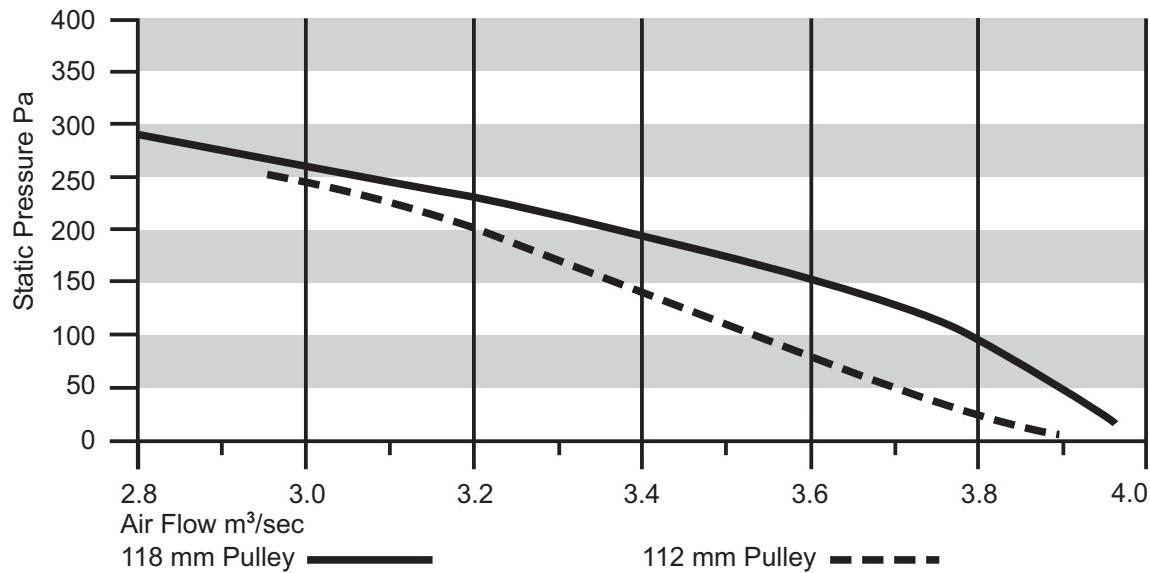
Max Burner Pressure	mbar	25.6	27.3	25.3	25.9
Max Gas Flow Rate	m <sup>3</sup> /h kg/h liquid l/h	3.51 6.5 12.8	4.09 7.58 14.9	4.39 8.13 16.0	4.97 9.21 18.1
Min Burner Pressure - Low Fire	mbar	12.5	13.4	12.4	12.7
Min Gas Flow Rate	m <sup>3</sup> /h kg/h liquid l/h	2.46 4.55 8.96	2.86 5.31 10.43	3.07 5.69 11.20	3.48 6.45 12.67

**LPG Butane (G30) Data - Inlet Pressure 29 mbar** Min 20 mbar Max 35 mbar

Max Burner Pressure	mbar	18.3	19.4	18.3	18.7
Max Gas Flow Rate	m <sup>3</sup> /h kg/h liquid l/h	2.65 6.5 11.3	3.09 7.55 13.2	3.32 8.09 14.1	3.75 9.17 16.0
Min Burner Pressure - Low Fire	mbar	9.0	9.5	9.0	9.2
Min Gas Flow Rate	m <sup>3</sup> /h kg/h liquid l/h	1.86 4.53 7.91	2.16 5.29 9.24	2.32 5.66 9.87	2.63 6.42 11.20

Gas rates corrected to standard conditions 1013.25 mbar 15°C.

\*See Page 44, Figure 19 for detailed Combination Fan/Limit Thermostat settings.

**4.4 DualAir® Performance Data - Graph of Air Flows v Static Pressure****4.4.1 DAT75 and 90 (2.2 kW or 4 kW motor)****4.4.2 DAT100 and 115 (4 kW motor)**

## SECTION 5: HEATER INSTALLATION

### 5.1 General

DualAir® units are designed for installation above 2.5 m. When connected to duct delivery systems any suitable location will be acceptable.

For floor mounting, the DualAir® unit may stand directly on its base.

### 5.2 Handling

All DualAir® units have steel channel sections at the base to be used to support the equipment. Three steel sections are also provided across the top of the unit for support. The DualAir® unit may be suspended from these top sections.

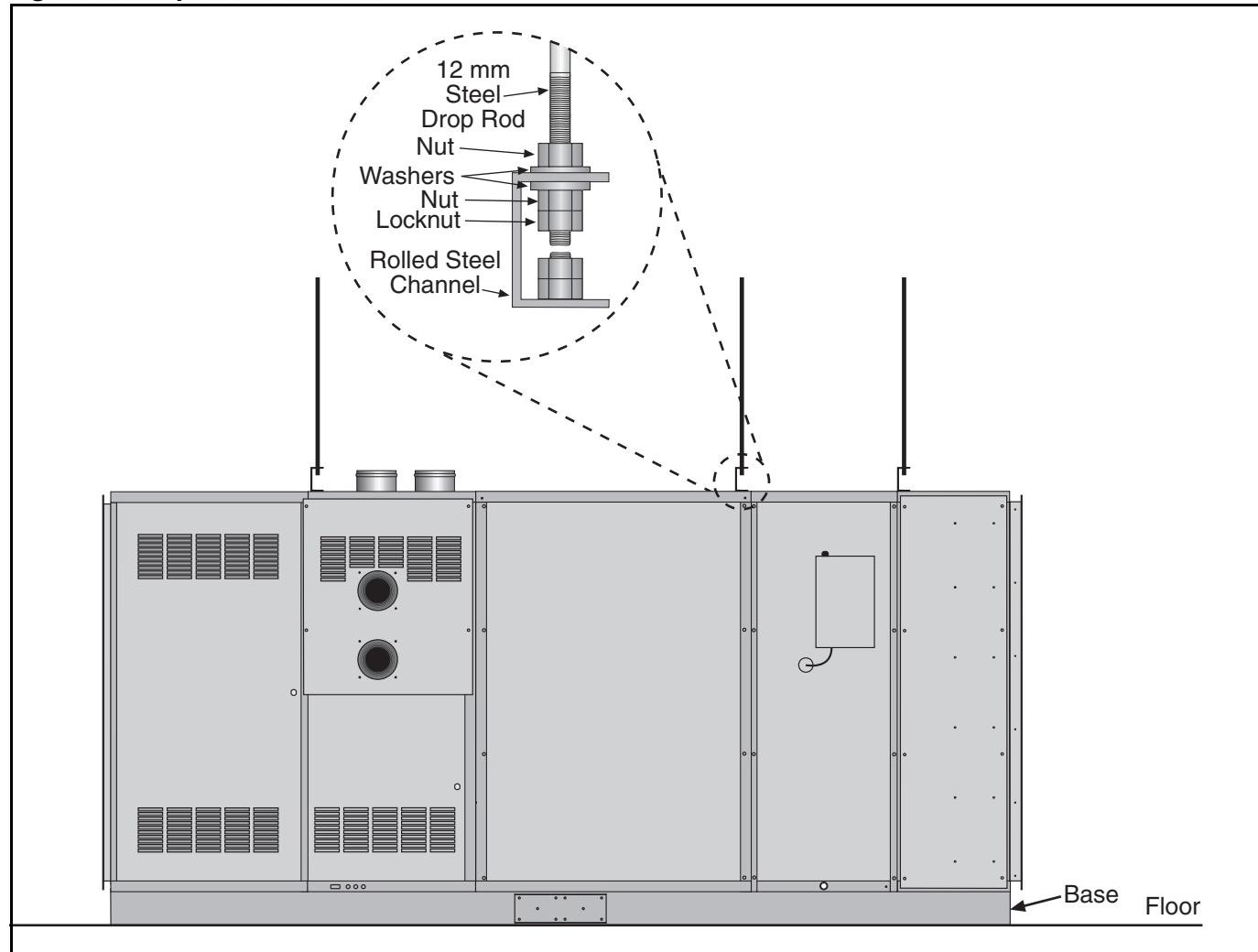
The DualAir® unit is heavy and proper handling equipment must be used by trained engineers.

### 5.3 Shelf Mounting and Suspension



For typical suspension See Page 9, Figure 3.

**Figure 3: Suspension Methods**



## SECTION 6: FLUE INSTALLATION

### 6.1 Flue Installation

#### ! WARNING



##### Fire Hazard

Some objects will catch fire or explode when placed close to the heater section.

Keep all flammable objects, liquids and vapours the required distance away from the heater section.

Failure to follow these instructions can result in death, injury or property damage.

The flue must terminate outside of the building. Flues and air intakes must be fully sealed and correctly sized for the model. Flues should be assembled as detailed on *Page 10, Figure 4 through Page 12, Figure 8*. The joints between the flue terminal and the roof or wall must be sealed. If the flue passes through a wall or ceiling of combustible material, it must be enclosed by a sleeve of non-combustible material and be separated from the sleeve by at least a 25 mm air gap.

**Flues and air intakes must be adequately supported so that the DualAir® unit does not bear the weight of the pipes.**

For flue termination See *Page 10, Figure 4 through Page 12, Figure 8*.

### 6.2 Type C<sub>12</sub>, C<sub>32</sub> & C<sub>62</sub> Appliance

Room Sealed.

The heaters are designed to be installed as room sealed appliances. The flue and air intake are run as separate pipes to the concentric wall or roof terminal. See *Page 12, Figure 8*.

### 6.3 Type B<sub>22</sub> Appliance

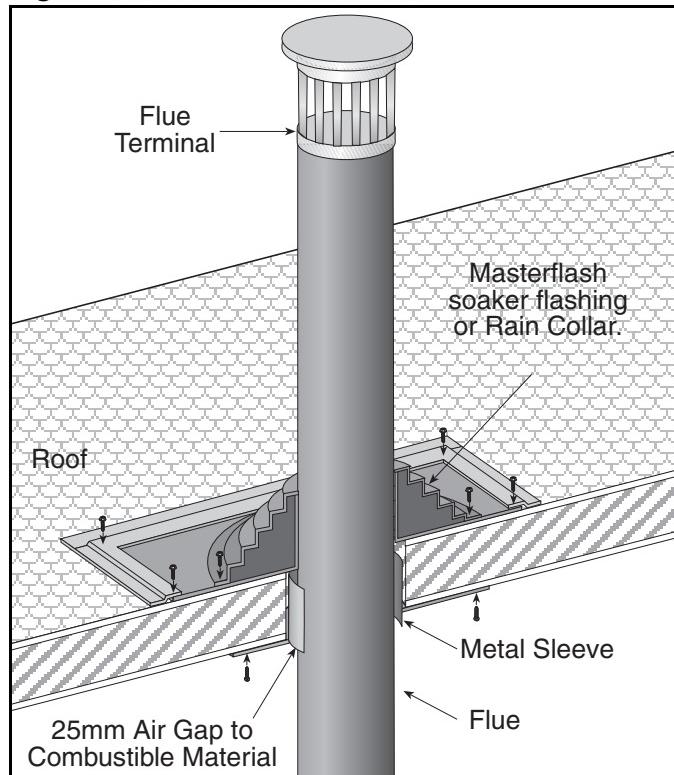
The flue must terminate outside the building and be fitted with a low resistance terminal.

See *Page 10, Figure 4 through Page 12, Figure 7*.

#### 6.3.1 Air Intake Terminal Cover

For Type B<sub>22</sub> appliance installations, an air intake terminal cover is an available option. The cover is scored flat sheet metal that must be bent into shape. See *Page 12, Figure 7*. Remove and retain the screws for the air inlet spigot. Use these screws to attach the cover in position over the spigot.

**Figure 4: Flue and Roof Detail**



### 6.4 Converting from Top to Side Terminations for Flue and Air Intake

1. Remove the control section lower door and upper panel. See *Page 11, Figure 5 through Figure 6* for details.

#### 6.4.1 Flue Conversion

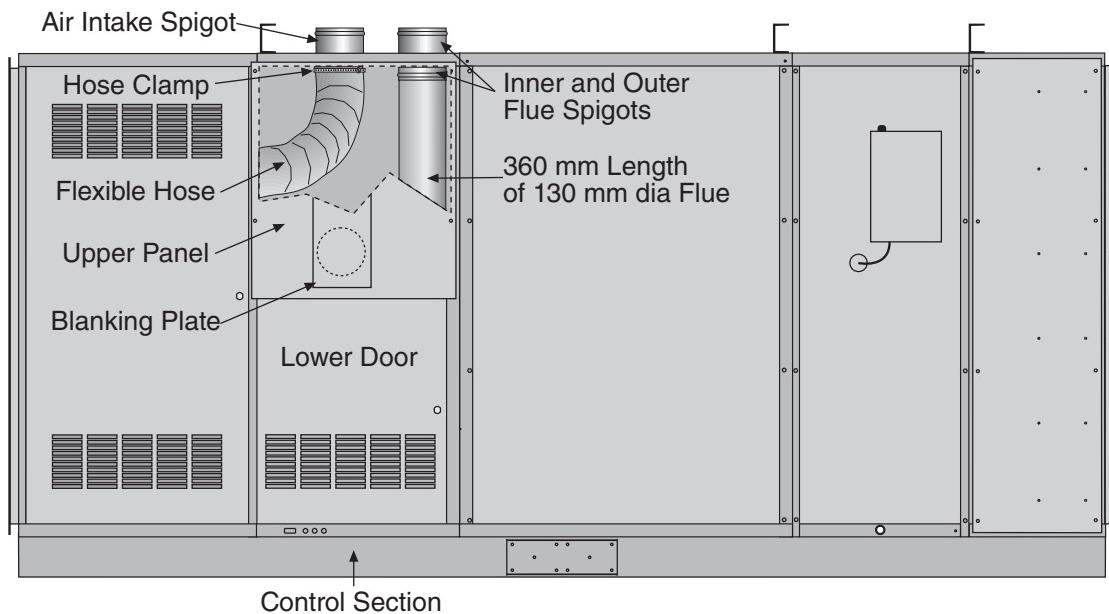
1. Remove the inner and outer flue spigots from the top. Retain the spigot and internal seal.
2. Disassemble the flue back to spigot "A". See *Page 11, Figure 6*. Ensure all seals are still in place.
3. Fit 90° bend directly into spigot "A" pointing forwards.
4. Cut a 90 mm length from the 360 mm flue that was removed.
5. Attach this piece to the 90° bend, then attach the inner spigot that was removed.

#### 6.4.2 Air Intake Conversion

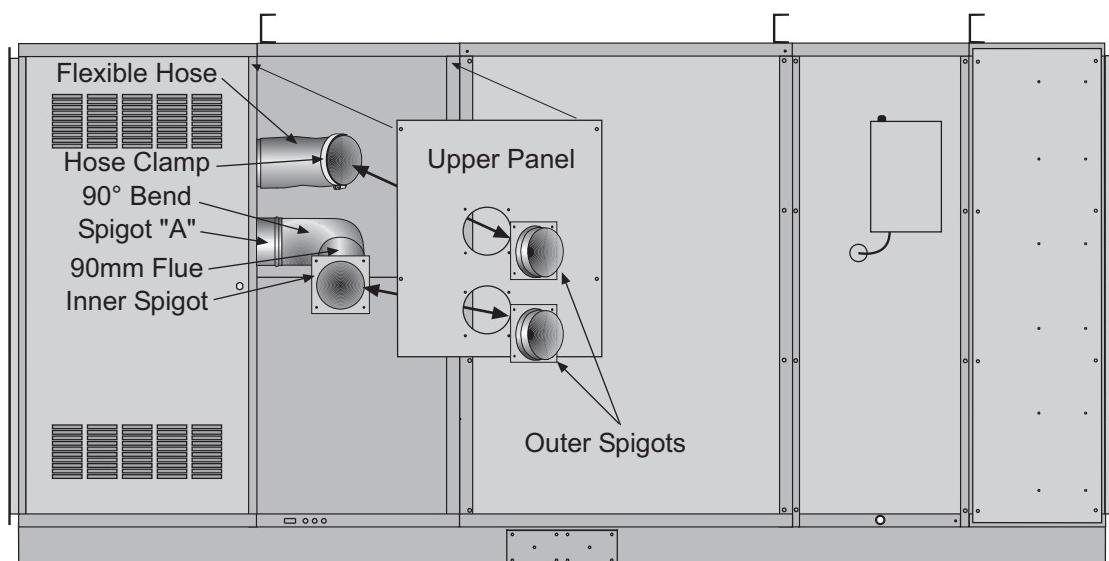
1. Remove the flexible hose from the air intake spigot.
2. Remove the spigot from the top.
3. Move the blanking plate from the upper panel (previously removed) to the top to cover the original flue and air intake holes.
4. Refit the upper panel feeding the air intake flexible hose through the upper hole and aligning the flue with the lower hole.

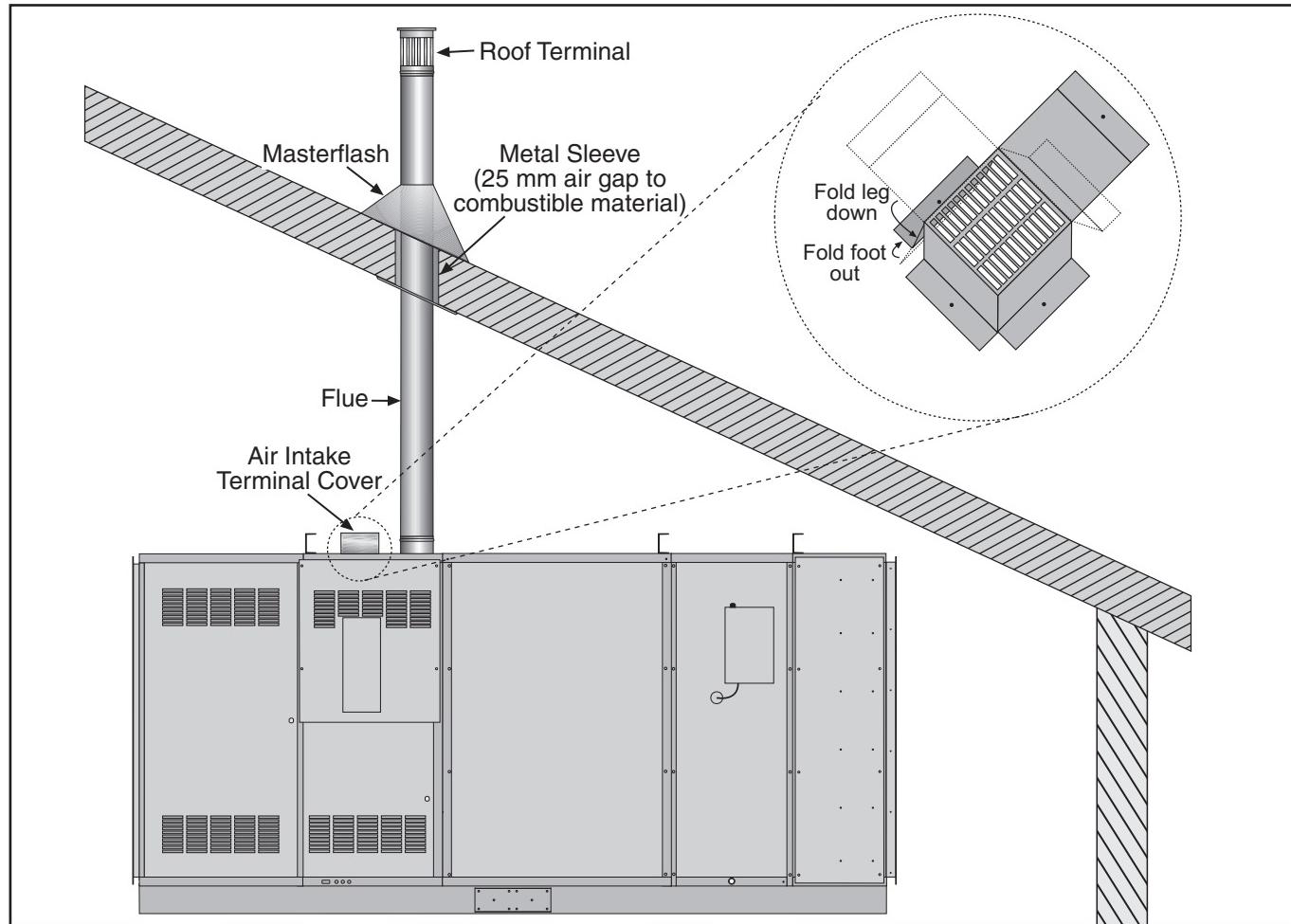
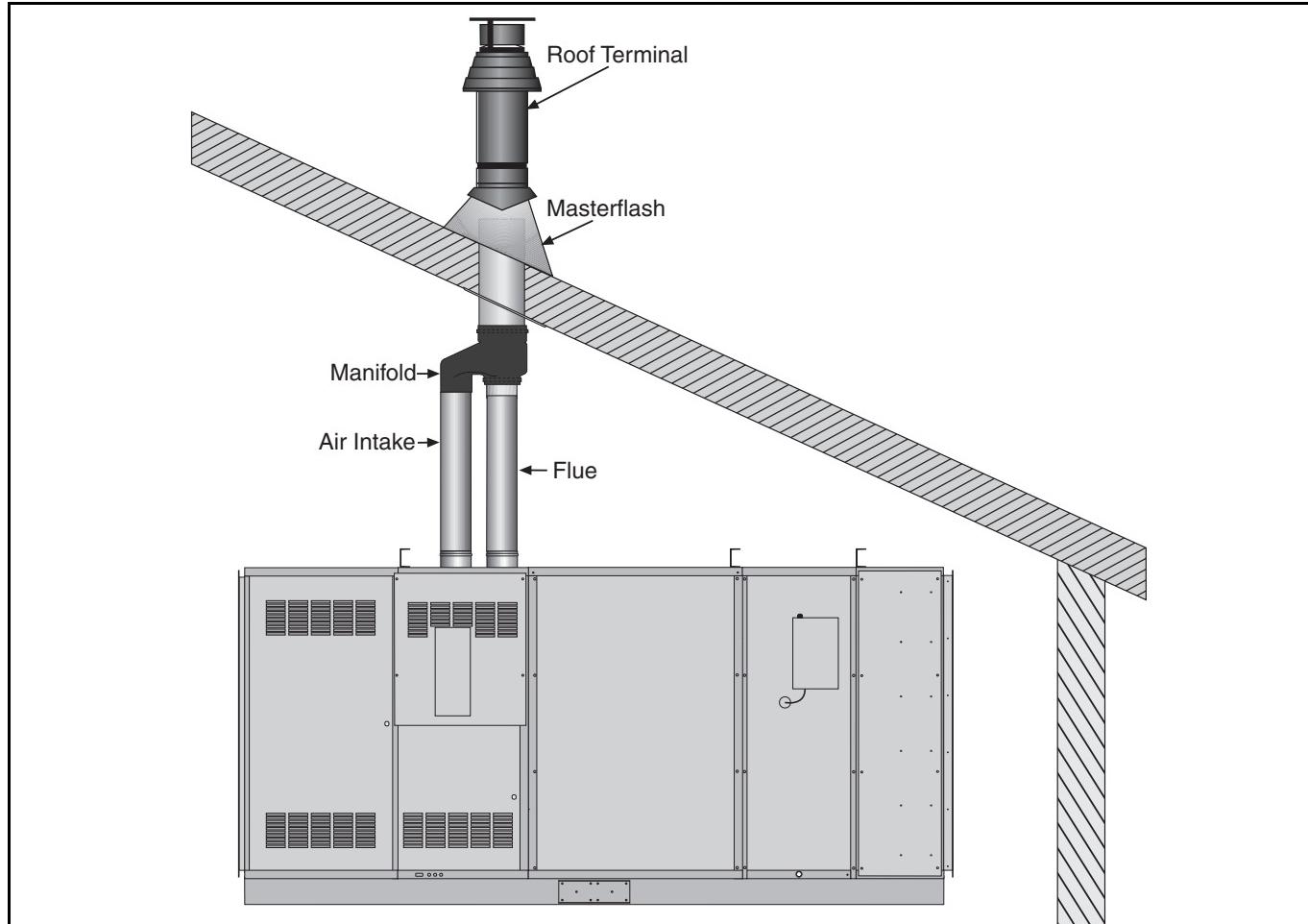
5. Refit the air intake spigot to the flexible hose re-using the hose clamp and to the upper panel using the original screws.
6. Align the flues' inner and outer spigots and attach through the holes in the upper panel re-using the original screws.
7. Refit the lower door.

**Figure 5: Control Section & Upper Panel**



**Figure 6: Alternate**



**Figure 7: Vertical and Horizontal Flue Termination - Type B<sub>22</sub> Appliance****Figure 8: Vertical and Horizontal Flue Termination - Type C<sub>12</sub> C<sub>32</sub> & C<sub>62</sub> Appliances**

## SECTION 7: AIR SUPPLY

### 7.1 Room Sealed Installation

When installed as a room sealed heater, the air for combustion is drawn in from outside the building. It is important to ensure that there is adequate ventilation to provide air for the distribution fan/s.

### 7.2 Open Flued Installation

Ensure adequate air supply at all times for both combustion and heating requirements in accordance with local and national codes. The air supply to the heater must be fitted with a low resistance terminal to prevent the ingress of debris. See Page 12, Figure 7.

#### 7.2.1 Heaters Installed Within the Heated Space

Where the volume of the heated space is greater than  $4.7 \text{ m}^3$  per kilowatt of total rated heat input and the air change rate is at least 0.5/h, additional high and low level ventilation will not be required.

For a building having an air change rate less than 0.5/h, ventilation will be necessary in accordance with local and national codes. Ventilation direct to outside must be provided as follows:

- Heaters above 70 kW heat input =  $350 \text{ cm}^2 + 2.5 \text{ cm}^2 \text{ per kW of rated heat input above } 70 \text{ kW}$

### 7.3 Building Ventilation

Where ventilation is required, air must be taken from an outside point where it is not likely to be contaminated or obstructed.

Where natural ventilation is used, suitable ventilation with outside air at low level must be provided in accordance with Section 7.2.1 and local and national codes.

Where mechanical ventilation is used, extract rate must be 5% - 10% less than the inlet rate. The mechanical ventilation must be interlocked with the burner on the heater.

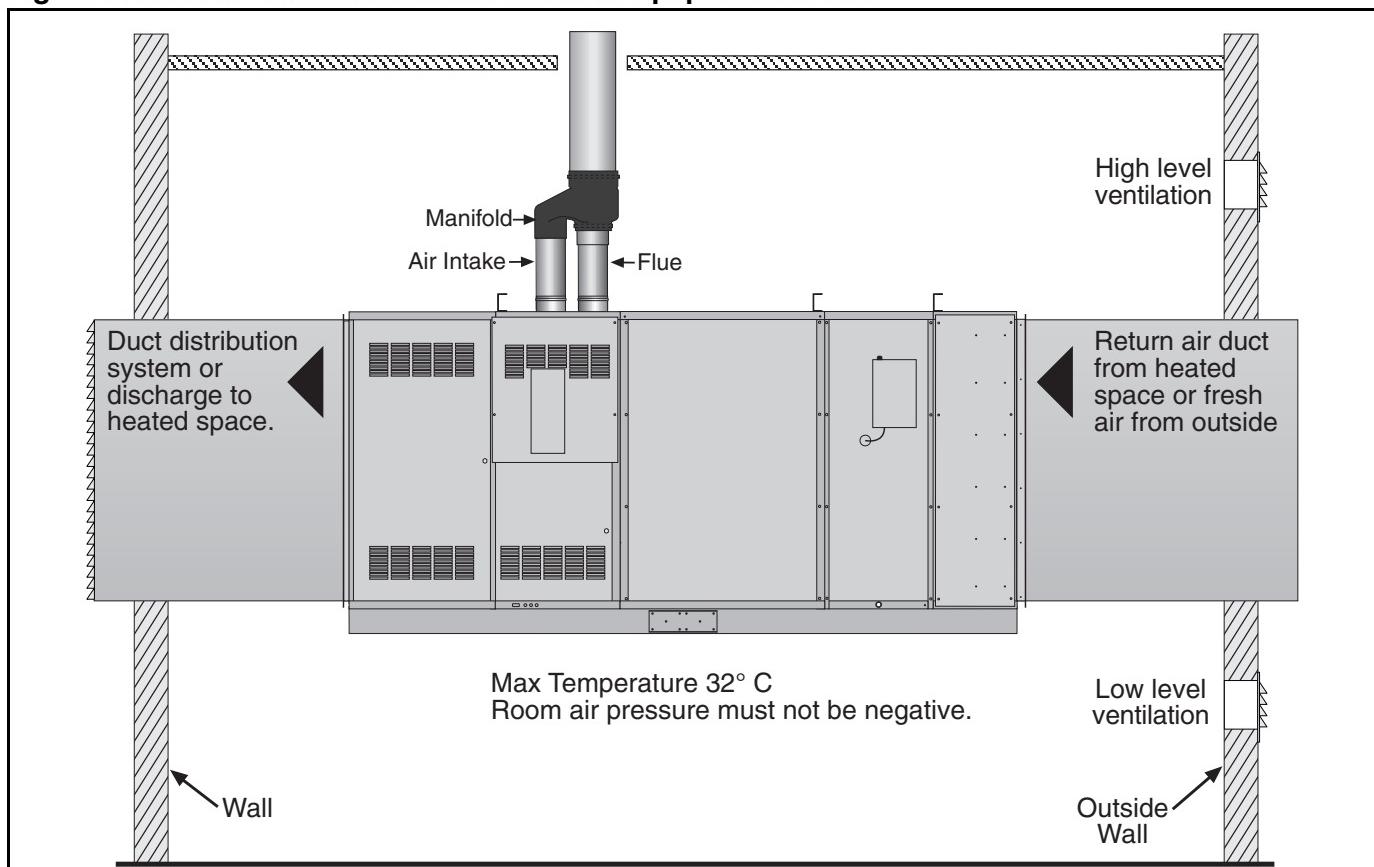
### 7.4 Isolated Equipment Rooms

Ventilation must prevent the isolated equipment room temperature from exceeding 32°C as well as prevent any negative air pressure within the room. See Page 13, Figure 9. Any isolated equipment room containing air heaters will require permanent air vents direct to outside air in compliance with local codes.

Where natural ventilation is used, suitable permanent openings at low and high level, communicating directly with the outside air, must be provided.

Where mechanical ventilation is used, extract rate must be 5% - 10% less than the inlet rate. The mechanical ventilation must be interlocked with the burner on the heater.

**Figure 9: DualAir® Units Installed in Isolated Equipment Rooms**



## SECTION 8: OPTIONAL HEATER CONFIGURATIONS

### 8.1 Distribution Duct

DualAir® units are designed to be connected to distribution and air inlet ducting.

It is recommended that flexible duct connectors and/or attenuators are used to reduce duct born noises.

It is recommended that the inlet ducting is arranged with both fresh air and recirculating air dampers to take advantage of the "free cooling" stage provided.

Distribution ducting must be insulated to prevent heat gain during cooling mode.

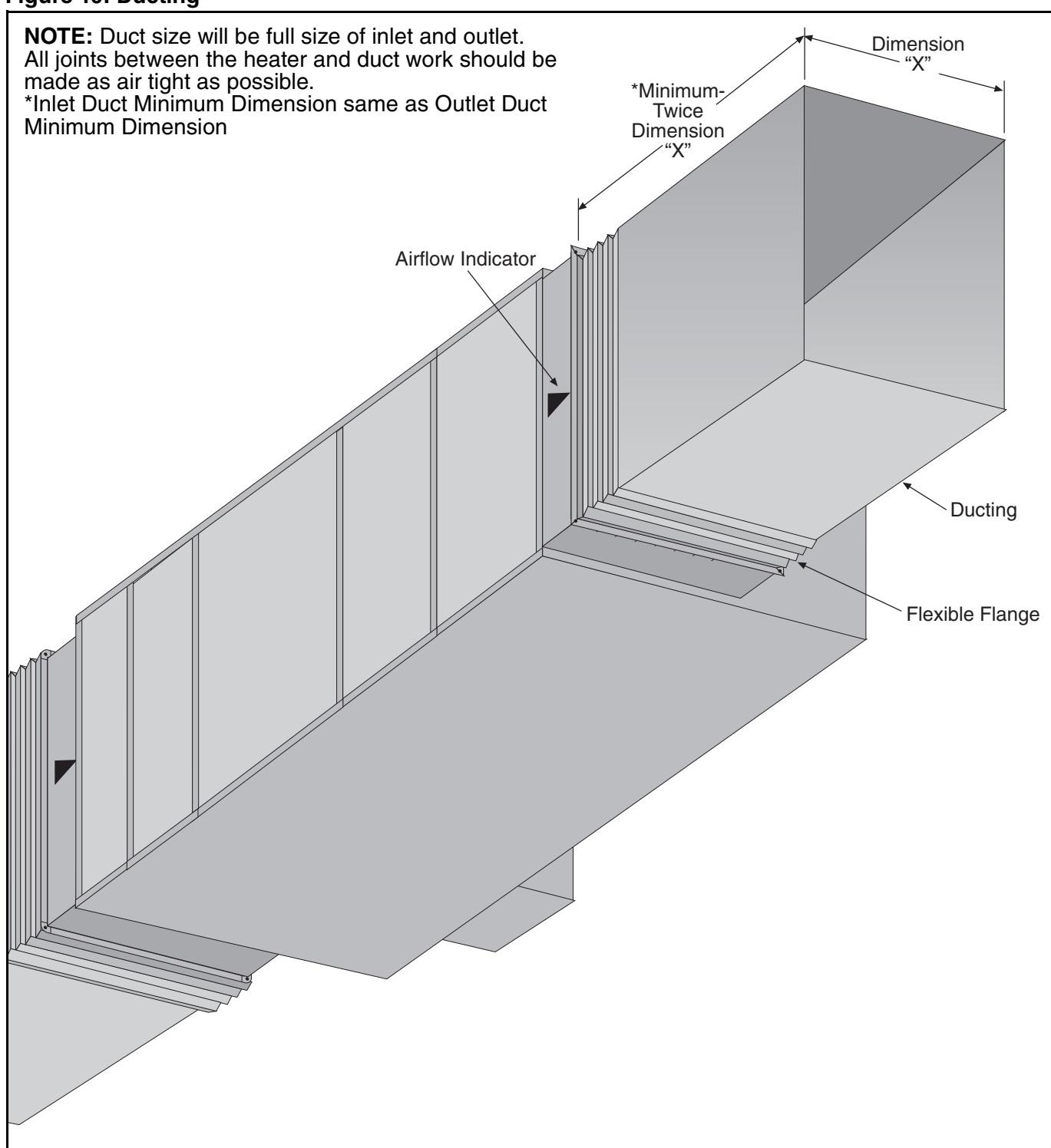
The air flow must be in the direction as stated for the version being installed with the heater at the discharge end.

**Figure 10: Ducting**

**NOTE:** Duct size will be full size of inlet and outlet.  
All joints between the heater and duct work should be made as air tight as possible.  
\*Inlet Duct Minimum Dimension same as Outlet Duct Minimum Dimension

The duct must be designed as described on Page 14, Section 8.1 and Figure 10 to ensure that there is a homogenous air flow across the whole heat exchanger. Failure to provide a properly distributed air flow will reduce the life of the heat exchanger.

**Contact Roberts-Gordon Europe Ltd. Design Department for recommendations regarding duct resistance and design. Tel: +44 (0) 121 506 7700**



## SECTION 9: GAS PIPING

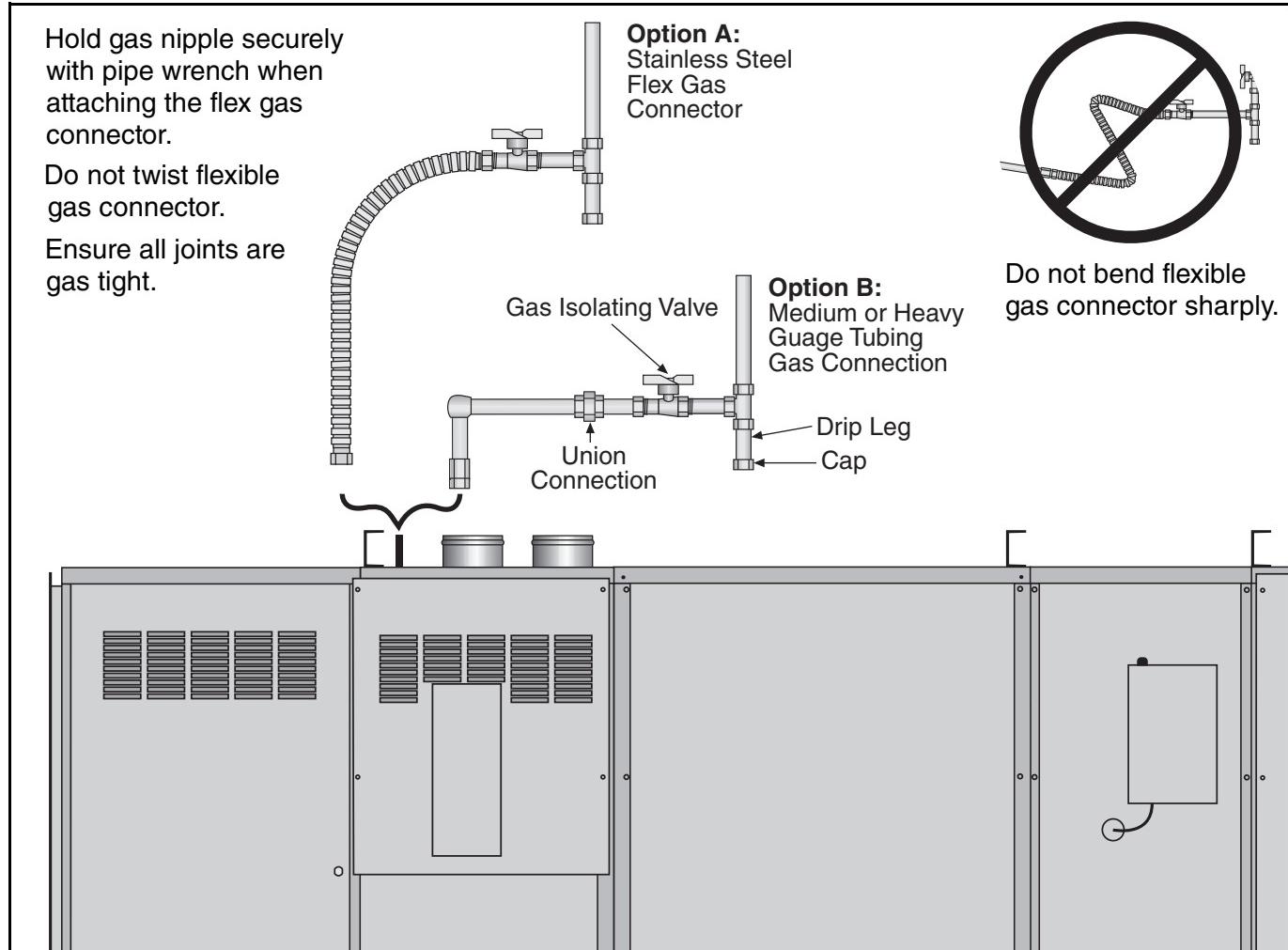


It is important that the gas supply pipe and the electrical connections do not support any of the heater's weight.

A gas meter is connected to the service pipe by the gas supply company. An existing meter should be checked, preferably by the company, to ensure that the meter is adequate for the rate of gas supply required.

Installation pipes must be fitted in accordance with local and national codes. Pipe work from the meter to the heater(s) must be of adequate size.

**Figure 11: Gas Connection with Stainless Steel Flex Connector**



### 9.1 Connections

Connect the heater to the gas supply ensuring that the final connections are as follows:

- The gas supply pipe is adequately sized to carry the total volume of gas for the complete installation.
- An isolating valve and union connection should be used and fitted into the supply adjacent to the heater.
- For suspended heaters, use an approved metal flexible connection between the isolating valve and the heater. **To reduce pressure loss, use one pipe size larger than the heater gas connection.**

**IMPORTANT** - The complete installation must be purged and tested for gas soundness in accordance with local and national codes.

## SECTION 10: WIRING AND ELECTRICAL INFORMATION

### 10.1 Electrical Supply

All heater models need a constant 400 V 50 Hz 3 Ø supply connected to terminals L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>, N & Earth. Polarity "L<sub>1</sub> & N" must be correct. The voltage between neutral and earth should be 0 and never exceed 15 volts.

All heaters and controls must be correctly earthed.

All external wiring must comply with the relevant local codes. Wire specification H05VV-F.

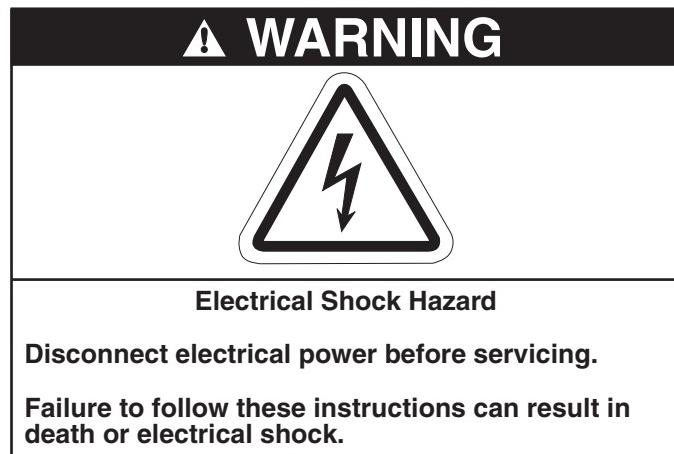
External controls must have a constant 230 V 50 Hz 1 Ø supply.

An isolator with a contact separation of at least 3 mm on all poles must be installed adjacent to, but not attached to, the DualAir® unit to disconnect all supplies to the heater and any remote control.

The final connection to the heater should be made by flexible cable or conduit to the main terminal block in the control section using 1 mm<sup>2</sup> cable on all models.

**All cables entering through the top of the heater should be routed via the metal shield to prevent inadvertent contact with the flue.**

Models	Fuse Size
DAT 75 & 90.....	5 A
DAT 100 & 115 .....	10 A



### 10.2 Remote Control

Roberts Gordon markets a dedicated DualAir® control that will operate all the available features of the unit.

The DualAir® unit requires a 230 V remote control to provide a time control and multistage heating/

cooling temperature control. See Page 20, Section 10.6.

To operate the modulating gas burner, a further input of 0-10 V DC is required with 0V giving minimum fire and a 10V giving full fire, wired in screened cable (Belden 8451 or equivalent).

#### 10.2.1 Remote Frost Thermostat

When required, connect to terminals 2 and 3 in the main terminal block.

Locate within the heated space adjacent to the most vulnerable equipment that requires protection.

See Page 17, Section 10.3 through Page 18, Section 10.4.

#### 10.2.2 Remote Fan Controls

The fan will operate automatically.

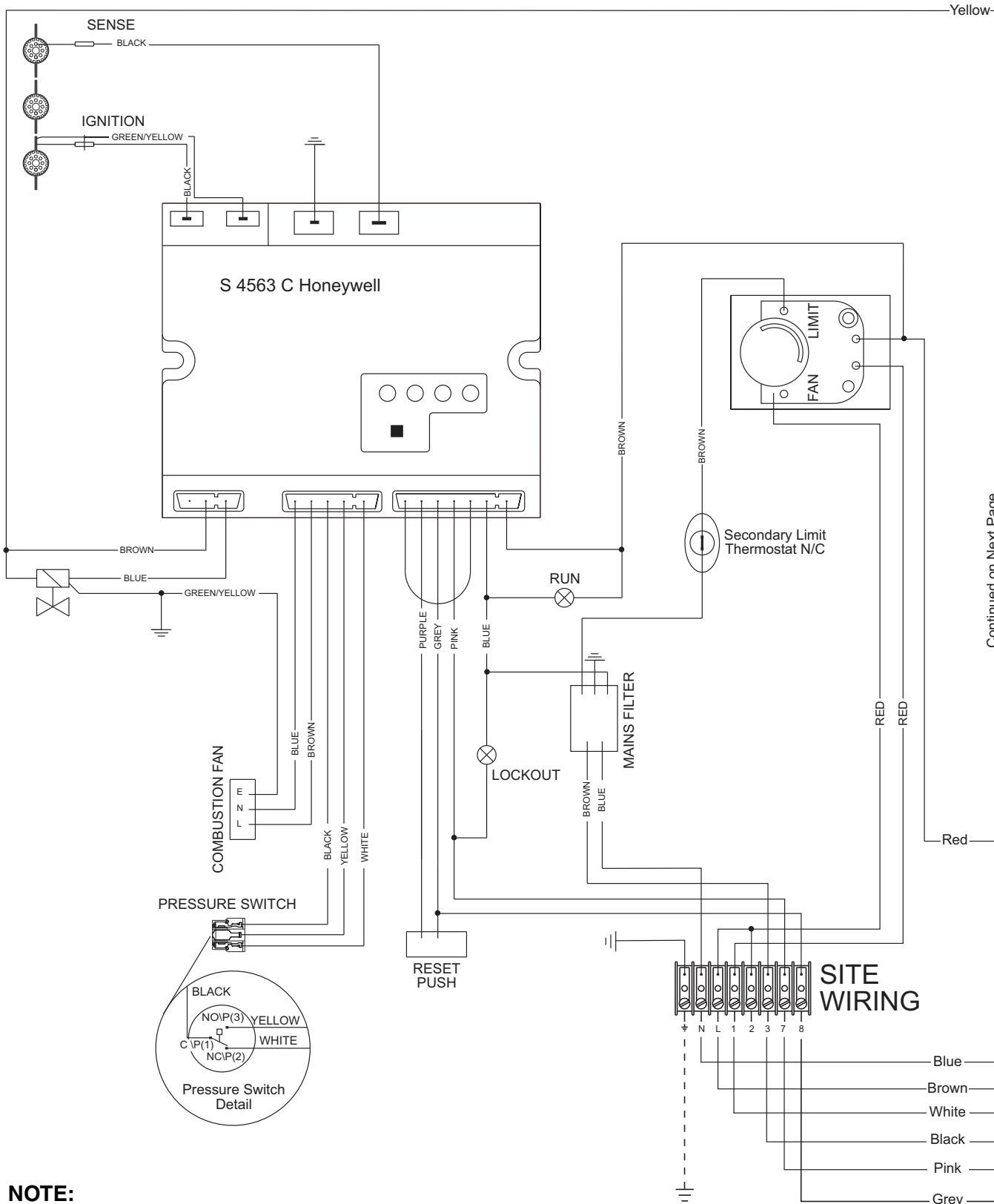
A switch or control wired between terminals 2 & 1 in the terminal block will allow external control of the fan(s).

The fan may be operated continuously from an external control, with the burner/cooling cycling on and off.

### 10.3 DAT Main Circuit Board Terminal Identification

Terminal Number	Use	Relay/Function	Operation
1 Input or Output	External Fan Control	Input for Remote Fan Operation Output for Fan Operation Monitor	Optional - Main Fan Runs from External Control
2 Output	230 V to external control		230 V 50 Hz supply of external thermostat or control
3 Input	Burner On	Burner Fires. R1 energizes with gas valve	Burner Operates. Fan Operates via R1
4 Output	230 V Burner ON Signal		Optional Remote Indication of Burner ON.
5 Output	Neutral for Signals & External Control		
7 Output	230 V Burner Lockout Signal		Optional Remote Indication of Burner Lockout
8 Input	Burner Lockout Reset from N (5)		Optional Remote Burner Lockout Reset (must be from N)
9 & 10	Volt Free Safety Circuits for External Condensers	Site Wiring to Condensers Normally Closed Controls Break on Fault Position	DualAir® units contains Coil Frost Thermostat, Coil Pressure Switch & Auxiliary Contact on Contactor
11 Input	230 V 1st Stage of Cooling (Free Cooling)	R2 On	Burner OFF Fan ON from R2 Dampers Output to T16
12 Input	230 V 2nd Stage of Cooling Cooling Coil Stage 1	R2 OFF R3 ON	Burner OFF Fan ON from R3 Dampers Output to T15 Output to Condenser 1 at T17 & 18
13 Input	230 V 3rd Stage of Cooling Cooling Coil Stage 2	R3 ON R4 ON	All input 12 Operations Output to Condenser 2 at T19 & 20
14, 15 & 16 Output	230 V Output for Optional Damper	From R2	14 = Neutral 15 = Recirculated Air 16 = Fresh Air
17 & 18	Volt Free Control Circuit Condenser 1	R3 ON	Normally Open Contact for Condenser 1
19 & 20	Volt Free Control Circuit Condenser 2	R3 ON R4 ON	Normally Open Contact for Condenser 2
21 & 22 Output	230 V Output to Remote Dirty Filter Warning		21 = L 22 = N
23 & 24	Volt Free Output to Remote Dirty Filter Warning	Alternative Dirty Filter Indication for BMS or DualAir® Control	Normally Open Contact for Dirty Filter Indication
25 & 26 Input	0 - 10 V DC Input for Modulating Burner	T3 Must Be Live to Operate Burner	0 V = Minimum Fire 10 V = Maximum Fire

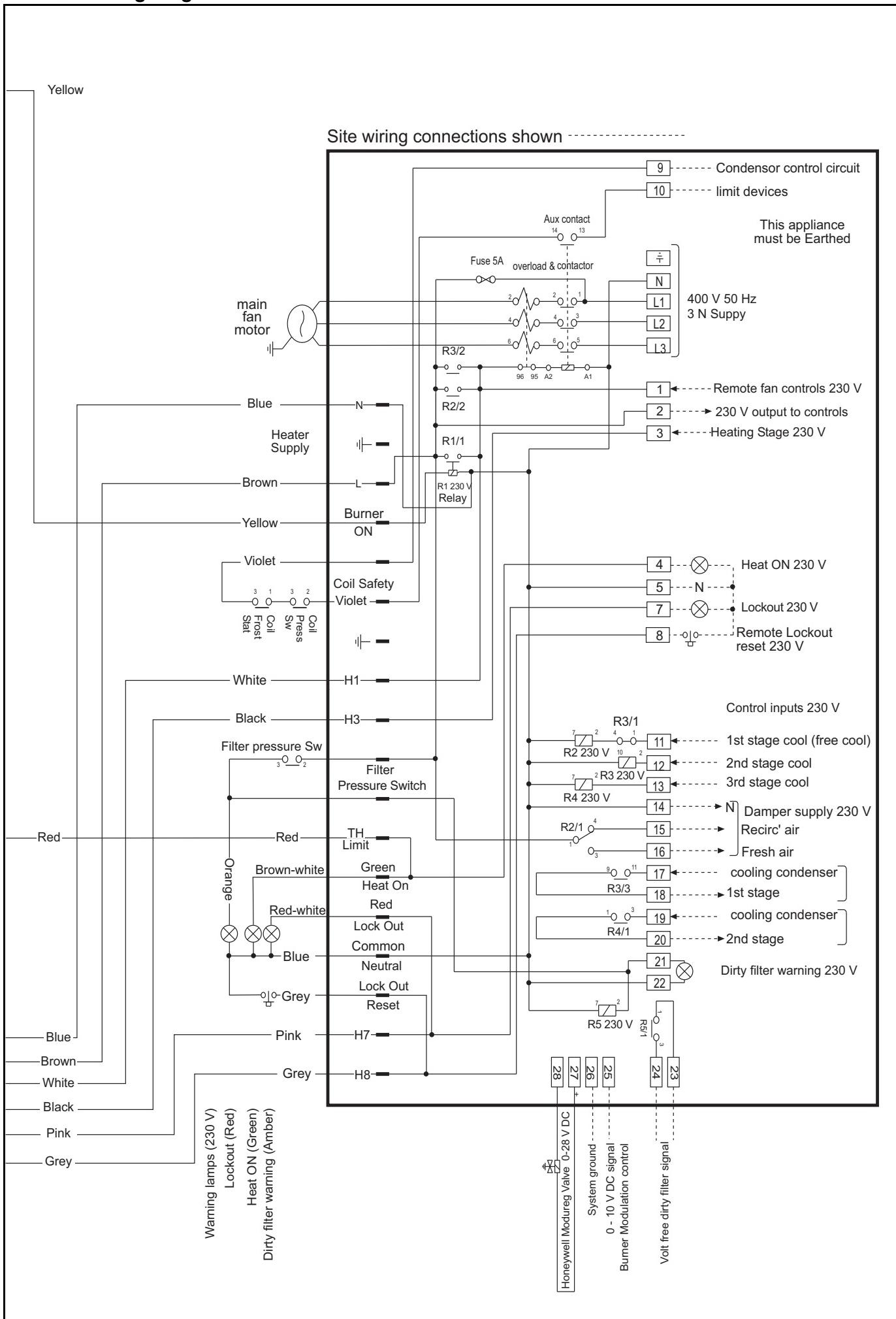
## 10.4 DAT Wiring Diagram

**NOTE:**

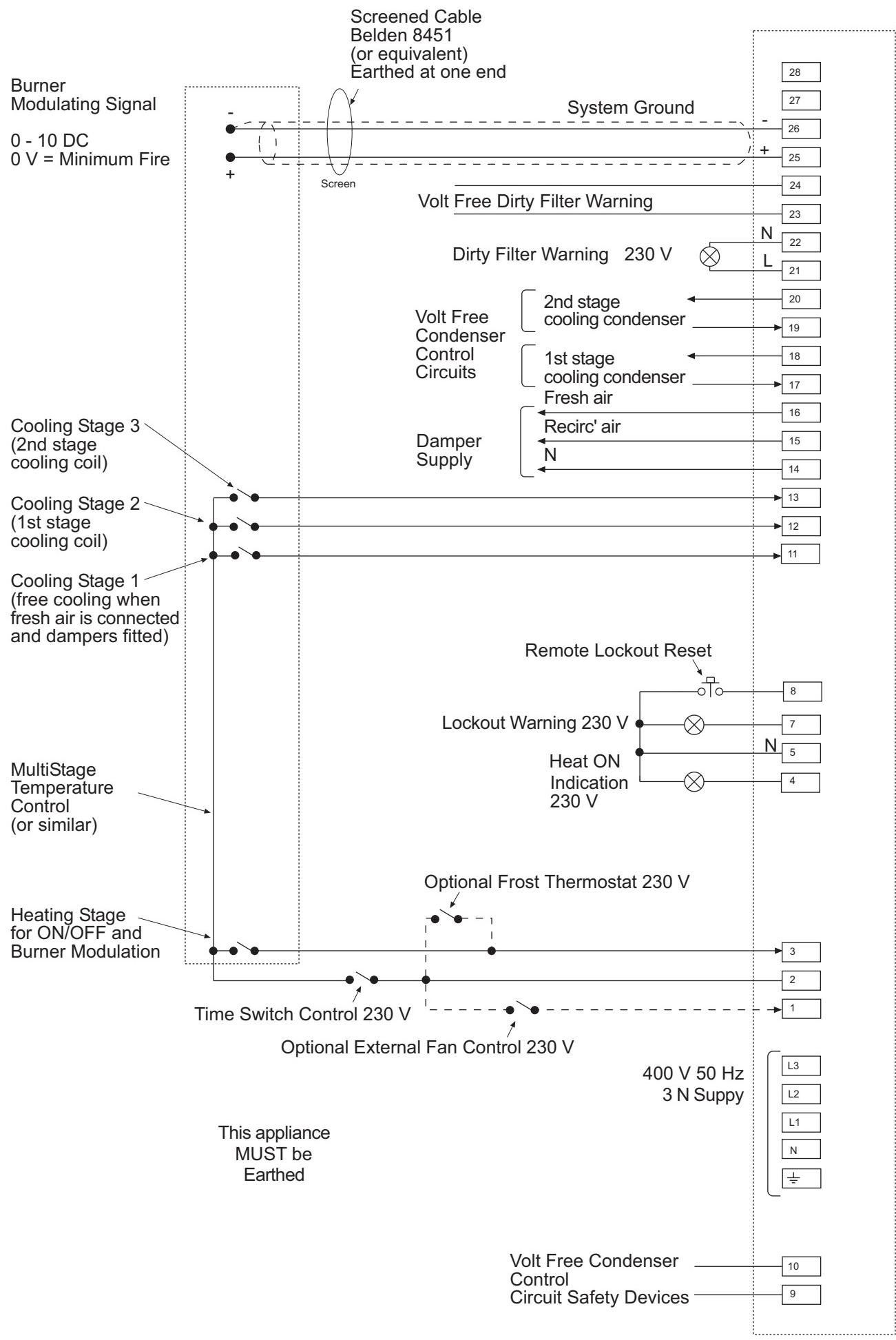
For external fan wiring,  
See Page 20, Section 10.6.

If any of the original wire supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C and 600 volts.

## 10.5 DAT Wiring Diagram



## 10.6 DAT Site Connections at Main Circuit Board



## SECTION 11: COMMISSIONING

### Gas Fired Heater

Installation, service, commissioning and annual inspection of the heater must be done by a contractor qualified in the installation and service of gas-fired heating equipment. Read this manual carefully before installation, commissioning, operation, or service of this equipment. All components are accessed via the hinged door. Opening the door exposes live electrical connections and hot components.

### Cooling Coils/Condensers

Installation, service, commissioning and annual inspection of the cooling equipment must be done by a contractor qualified in the installation and service of refrigeration equipment. Read condenser manufacturer's manual carefully before installation, commissioning, operation, or service of this equipment.



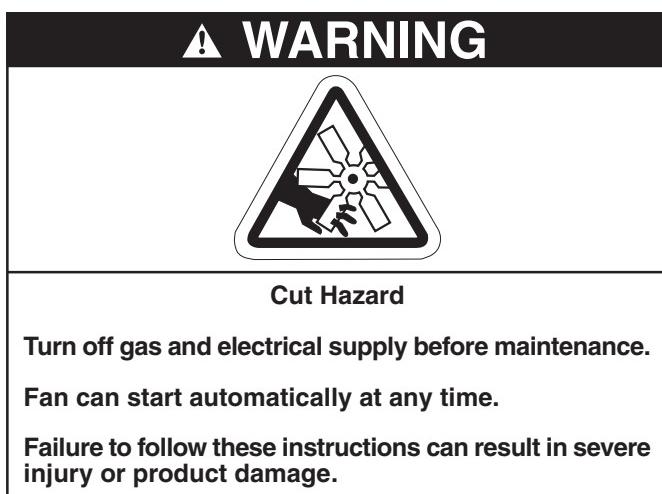
### 11.1 Pre-Commission Checks

**All pre-commission checks must be carried out before lighting the heater.**

Ensure that the heater and all controls are suitable for the gas, pressure and electrical supply to which they are to be connected.

#### 11.1.1 Louvres

Where fitted, the air delivery louvres need to be set during commissioning to give the required air distribution.



### 11.1.2 Electrical Checks

1. Check that all site wiring is connected in accordance with the appropriate wiring diagrams on Page 17, Section 10.3 through Page 20, Section 10.6.
2. Check the correct fuse size is fitted; See Page 16, Section 10.1.

### 11.2 Gas Supply

All aspects of the gas installation including the gas meter must be inspected, tested for soundness and purged in accordance with local and national codes.

### 11.3 Mechanical Checks

1. Check that the fan is free to run and that the fan rotates in the correct direction. To reverse rotation, transpose two of the incoming phase connections.
2. Check that the flue and air intake are installed in accordance with these instructions and local regulations.
3. Check that the settings of the Combination Fan/Limit thermostat are correct - See Page 7, Section 4.3 and Page 8, Figure 4.4.

**NOTE:** The second limit thermostat is preset and sealed at the factory and is not adjustable.

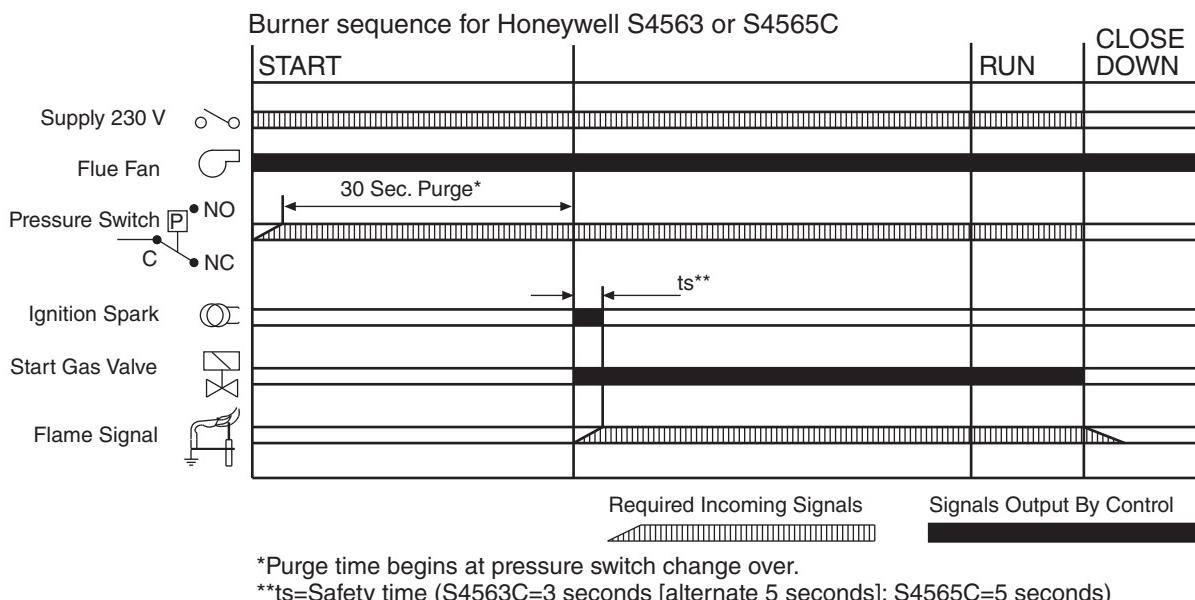
### 11.4 Begin Commissioning

#### 11.4.1 Before Operating the Heater

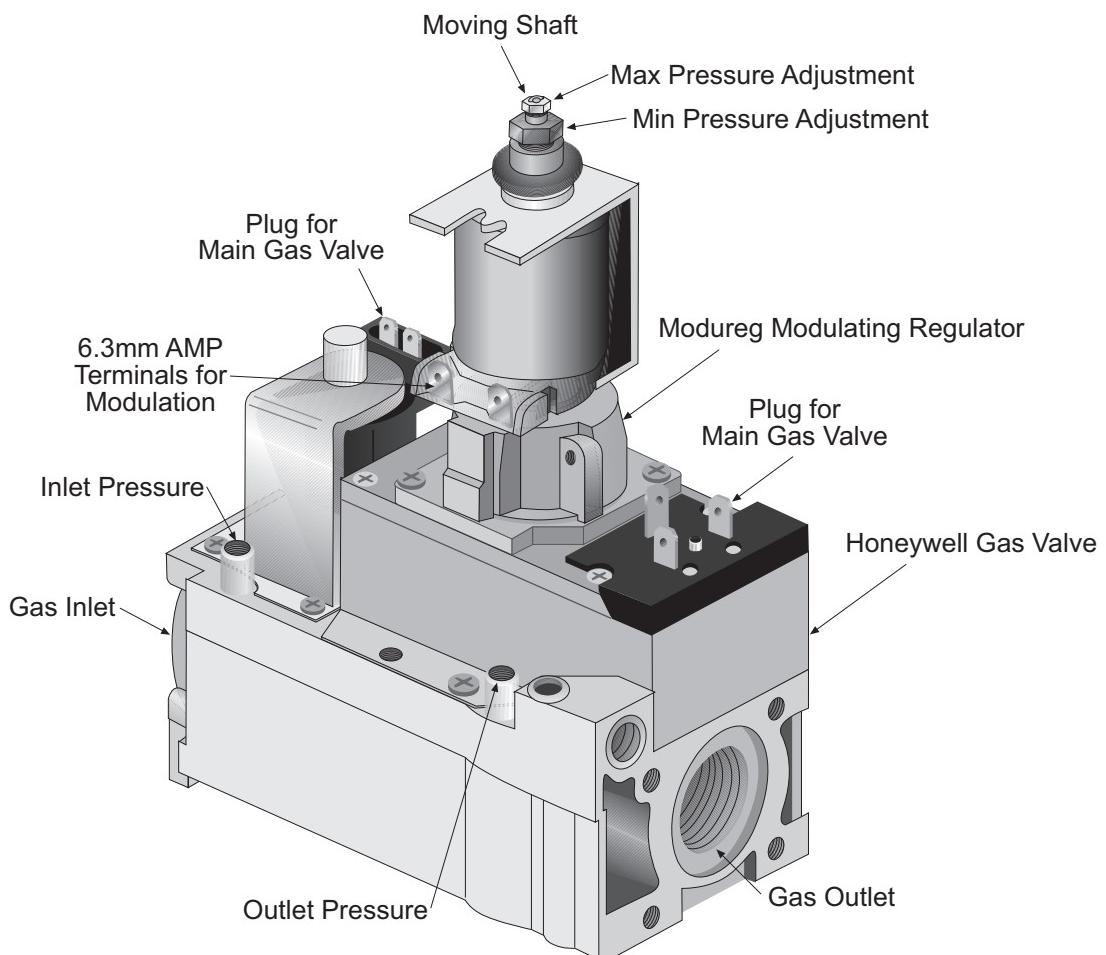
To ensure that all the controls are in safe working order, operate the heater for the first time with the isolating gas valve turned off.

1. Turn off the isolating gas valve
2. Using the installed external control, turn on the burner. The automatic sequence will now begin as described on Page 22, Figure 12.

There will be no ignition of the burner and lockout will occur, proving the controls are operating correctly.

**Figure 12: Automatic Burner Control Box Sequence**

If at any stage the flame fails, the control will go to "lockout". The red light will illuminate and the control must be manually reset before further start attempt.

**Figure 13: Modureg Gas Valve**

## 11.4.2 Commissioning the Gas Valves

All DualAir® units are fitted with fully modulating burner operation. The Honeywell automatic gas valves are fitted with the Honeywell Modureg modulating regulator.

See Page 22, Figure 13.

The Modureg device provides the adjustments for maximum and minimum firing and is set using the two adjustments. See Page 22, Figure 13.

The external control will operate the burner between these two limits depending on heat demand.

**The minimum set point must not be set lower than the minimum burner pressure stated on Page 6, Section 4.2.**

## 11.4.3 Commissioning the Gas Valve

There are two stages to commissioning the modulation equipment.

**The minimum pressure setting must be adjusted first, any adjustment of the minimum pressure setting will affect the maximum pressure setting.**

For ON/OFF non-modulating operation set the minimum firing rate to be the maximum burner pressure as on Page 6, Section 4.2

### 11.4.3.1 Set Minimum Pressure

1. Disconnect the leads from the coil of the Modureg regulator.
2. Connect a suitable manometer to the burner pressure test point of the main gas valve.
3. Turn on any external controls and allow the burner to fire for at least five minutes.
4. Remove cap and using a suitable 9mm spanner adjust the burner minimum set pressure to the value shown on Page 6, Section 4.2.

### 11.4.3.2 Set Maximum Pressure

(Not Required for ON/OFF burners)

1. Press in the moving shaft of the Modureg valve and hold in this position while adjusting the burner maximum pressure to the value shown on Page 6, Section 4.2.

For adjustments See Page 22, Figure 13.

**NOTE:** If the correct burner pressure cannot be reached, then check the inlet pressure to the valve, with the burner firing. See Page 6, Section 4.2 for inlet pressure requirements.

**Do not continue to adjust the regulator if the pressure is not changing.**

If the inlet pressure is too low to allow a correct burner pressure setting, then the gas inlet pres-

sure must be corrected before completing the commission.

2. Release the moving shaft and observe that the burner pressure returns to the minimum setting.
3. Turn off the external controls and reconnect the electrical leads to the Modureg regulator.
4. Turn on the external controls and allow the burner to fire once again observing the burner pressure.
5. Using the temperature set point device of the installed control system, set for maximum burner firing and observe that the burner pressure slowly rises to the maximum as set.
6. Reset the temperature set point by small steps until the burner pressure slowly drops to the minimum pressure set. Repeat Step 5 and observe that the maximum set point is again achieved.

### Check Gas Rate

1. After burner pressure adjustment, allow the heater to operate for at least 15 minutes and then re-check settings.
2. Remove the manometer and refit all covers to the valve and tighten the screw of the outlet pressure tap.
3. Check gas flow rate at gas meter.

## 11.5 Combustion Testing

The only adjustment to alter combustion performance is burner pressure. Combustion quality must be tested to prove correct heater operation. Incorrect results will indicate faults with the installation or appliance.

Combustion testing must be carried out at full fire with all covers in place. The flue gas is sampled in the flue, within 1 meter of the heater. The values of CO<sub>2</sub> should be between 6.5% to 8.0% for natural gas and 7.0% to 9.1% for LPG dependant upon model.

The CO will be up to 80 ppm (0.008%) dry, air free dependant upon model. Temperature rise of the flue gases above ambient should be approximately 160°C to 180° C. Seal test hole in flue after testing.

Following the above operate the heater for 30 minutes at the minimum firing rate. Following this time the temperature of the products of combustion in the flue should be measured. If the flue products temperature is below 80° C then the minimum firing rate should be increased. Continuous operation of the burner with flue gas temperature of below 80° C will cause condensation to form in the heat exchanger and flue system. This will cause nuisance

water collection and a shortened heat exchanger life.

### **Pressure Switch**

The pressure switch is factory pre-set for each model and is not adjustable.

### **11.6 Turning Off the DualAir® Unit**

Set the external controls to the off position and the main burner will stop.

The fans will run until they are stopped automatically by the fan thermostat.

**Do not use electrical isolator for control of heater. Electrical isolator will switch off the fan. Heat exchanger could be damaged. Warranty will not cover damage to the heat exchanger if operated improperly.**

### **11.7 External Controls**

External controls may include time switch, room thermostat and frost thermostat. Operate each control to ensure that they function correctly. Set the time switch (if fitted) and room thermostat to the users' requirements. Operate the external controls and ensure that the installed cooling stages operate correctly as described *on Page 17, Section 10.3*.

### **11.8 Complete the Commissioning**

Ensure that all covers are fitted correctly and all test points are properly sealed.

### **11.9 Instruction to the User**

Explain the controls of the DualAir® unit to the user including how to turn it on and off, using the controls fitted on site.

Give this manual to the user.

Ensure that the user is shown and understands the importance of maintaining clearances to combustibles and the user instructions *on Page 25, Section 12 through Page 26, Section 12.6* and all warnings defined in this manual.

## SECTION 12: USER INSTRUCTIONS

### 12.1 User Instructions

The DualAir® units are fully automatic and operate from the external controls fitted on site.

The only user controls at the heater are the:

Burner lockout reset button:

..... See Page 26, Section 12.3.3

Limit thermostat reset:

..... See Page 25, Section 12.3.1

Second limit thermostat reset button:

..... See Page 25, Section 12.3.2



### 12.2 Heater Operation

When the heater has been switched on by the remote controls installed, the main burner will automatically turn on.

The burner control box will control the ignition of the flame.

All heaters require a constant gas and electricity supply which must not be interrupted during the normal operation of this heater.

#### 12.2.1 Warning Lights

The DualAir® unit has three warning lights; GREEN = Heater ON, burner attempting to fire

RED = Burner LOCKOUT, see Section 12.3.3.

AMBER = Dirty Filter, replace filter, air flow is dropping to an unacceptably low value.

**Figure 14: Heater Operating Sequence**

### 12.3 Common User Controls

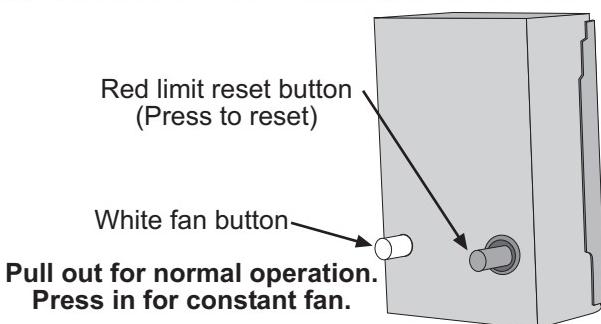
#### 12.3.1 Combination Fan/Limit Thermostat

The Combination Fan/Limit Thermostat is located inside the access door at the top of the heater. See Page 38, Section 16.3.

This control ensures the heater does not blow cold air in the normal heating cycle and protects the heat exchanger against overheating.

**Figure 15: Fan/Limit Thermostat**

If the air flow is reduced due to power failure the limit thermostat will cause the burner to lockout.



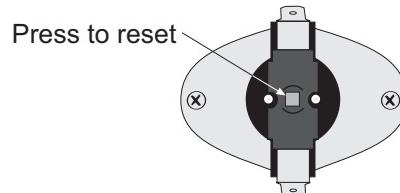
The combination fan/limit thermostat is preset during commissioning.

See Page 7, Section 4.3 and Page 8, Figure 4.4.

**NOTE:** To reset, the heat exchanger must be cool.

Description	Part Number
Combination Fan/Limit Thermostat	K017A

#### 12.3.2 Secondary Limit Thermostat

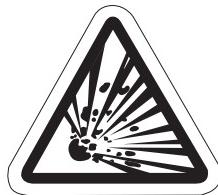


These are hand reset devices to give further protection against fan failure.

**NOTE:** To reset, the heat exchanger must be cool.

Description	Part Number
Secondary Limit Thermostat	90412100

## ⚠ WARNING



### Explosion Hazard

If control locks out, do not make more than 3 attempts to restart the heater.

Dangerous gas mixtures can build up.

The fault must be traced and repaired by a registered installer or service engineer.

Failure to follow these instructions can result in death, injury or property damage.

**Do not operate the DualAir® unit without filters as the cooling coil may become blocked and impossible to clean.**

### 12.5 Heating Section Lighting Instructions

#### 12.5.1 To Turn On Heater

1. Ensure that the electrical and gas supplies to the heater are on. Check that the on site controls are “ON”.

**NOTE:** The thermostat setting must be above the ambient temperature for the heater to operate.

2. The green light will be on and the automatic firing sequence will begin as described on Page 22, Figure 12. The heater will now operate automatically under the control of the on site controls. Following long shut down periods, the control may go to lockout. See Page 26, Section 12.3.3.

#### 12.5.2 To Turn the Heater Off

Set the installed remote controls to “OFF”.

The burner will turn off immediately.

The fan will continue to run for a few minutes.

To restart turn the control used above to “ON”.

### 12.3.3 Burner Lockout Reset Button

The red warning light will illuminate when the control has gone to lockout. This may be caused by flame failure. Press the reset button,(See Page 5, Section 4.1), or the remote reset if installed on site.

### 12.4 Cooling Section Operation

The temperature control will bring on the fan to operate the DualAir® unit in cooling mode dependent on the current temperature and set point.

Once the temperature rises above the set point, there are three stages of cooling available dependant on site installation.

#### Cooling Stage 1 (optional free cooling):

The fan runs and change over dampers (if fitted) allow fresh air to be drawn from outside.

If the temperature continues to rise then

Cooling Stage 2 operates: The fan runs, the dampers (if fitted) return to recirculating air and the first condenser operates to provide cooling at half load.

Should the temperature continue to rise,

Cooling Stage 3 operates: The fan runs, the dampers (if fitted) remain in recirculating air and the second condenser operates to provide cooling at full load.

#### 12.4.1 Filters

Air cleaning filters are fitted to the DualAir® unit to protect the cooling coil and provide improved environmental conditions.

The filters will require to be replaced at least three times per year and in dirty environments cleaning of the filters may be required at more frequent intervals.

When the filters are dirty the warning light will show see Page 25, Section 12.2.1. The filters must be cleaned or replaced immediately.

### 12.6 Simple Fault Finding

Possible reasons for the heater not operating are:

1. Gas supply not turned ON.
2. Electricity supply not turned ON.
3. The time and/or temperature controls are not “ON”.
4. One or both of the limit thermostats may have operated. This may be caused by an interruption of the electrical supply or failure of the distribution fan.

If the limit thermostats persistently operate, there is a fault which must be investigated by a contractor qualified in the installation and service of gas-fired heating equipment.

#### 12.6.1 Simple Fault Finding (burner faults)

If the burner fails to ignite for any reason, it will go to lockout. This will be indicated by the red light on the heater or at the remote indicator (if fitted).

1. Press in and release the lockout reset button. If a remote reset is not fitted a reset button is on the side panel of the heater. See Page 5, Section 4.1.

**FOR YOUR SAFETY**

*If you smell gas:*

1. Open windows.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Leave the building.
6. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
7. If you cannot reach your gas supplier, call the Fire Department.

**⚠ WARNING****Fire Hazard**

Do not store or use petrol or other flammable vapours and liquids in the vicinity of this or any other appliance.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

## SECTION 13: SERVICING

### 13.1 Servicing Instructions

After commissioning, the DualAir® unit will require maintenance to be carried out annually. If the DualAir® unit is used in a dirty or dusty area, more frequent maintenance may be necessary.

Installation, service and annual inspection of heater must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

### ! WARNING



#### Cut Hazard

**Turn off gas and electrical supply before maintenance.**  
**Fan can start automatically at any time.**  
**Failure to follow these instructions can result in severe injury or product damage.**

**NOTE 1:** After any maintenance or repair work always test fire the heater in accordance with the commissioning instructions on Page 21, Section 11 through Page 24, Section 11.9 to ensure all safety systems are in working order before leaving the heater to operate. Minor faults may be traced by using the troubleshooting charts on Page 31, Section 15 through Page 34, Section 15.5.

**NOTE 2:** Check all gas pipes and pipe joints to ensure there are no cracks or gas leaks.

**NOTE 3:** Inspect all suspended components and hardware. Insure that they are in good condition, properly tightened, and corrosion free.

#### 13.1.1 Cooling Equipment

The cooling coil does not require maintenance except that during filter replacement it is recommended to clean the surface of the coil with a soft brush and vacuum cleaner. Carry out any maintenance recommended by the condenser manufacturer.

#### 13.1.2 Filters

The air filters should be inspected regularly to ensure that no excessive build up of deposit is being experienced. If heavy deposit is being formed, then the filters may be cleaned using a vacuum cleaner. Filters should be replaced at least every four months

to ensure that adequate air flow.

The cooling equipment will automatically turn off should the air flow drop to a preset low value even though the fan will still run. The maximum resistance across a dirty filter should be no more than 150 Pa (1.5 mbar) and the dirty filter warning light will be on. A resistance higher than this indicates that the filters must be replaced.

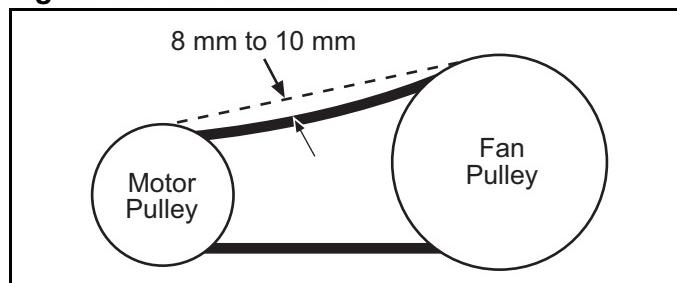
### 13.2 Burner Maintenance

1. Open the hinged door and remove the burner compartment cover. See Page 37, Section 16.2.
2. Clean any deposits from the main burner which may have formed in the injectors or venturi of the burner. See Page 37, Section 16.2.
3. Remove the ignition electrode and flame probe. Check condition of ignition electrode and flame probe. Clean off any deposits which may have been formed, check condition of ceramic insulators. Replace as necessary.

### 13.3 Fan/Motor Assembly Maintenance

The main fan bearings are permanently sealed and do not need lubrication. Before cleaning, turn off gas and electrical supply. Remove the fan compartment covers and use a small brush or duster to clean the fan blades from each side. Replace fan(s) when done.

**Figure 16: Belt Tension**



Check the condition and tension of the drive belts. The condition is best inspected with the belts removed. Check for chaffing or lateral cracks. Replace belts as a matched pair as necessary. Do not over-tighten belts, as this may cause bearing damage.

### 13.4 Heat Exchanger Maintenance

The heat exchanger will remain clean unless a problem has developed with combustion. Inspect the heat exchanger. Look for signs of overheating at the front tubes which may indicate burner over firing or persistently low air flows.

### 13.5 Gas Control Valve Maintenance

No regular maintenance is required on these devices. To change gas control valves, See *Page 36, Step 16.1 and Page 40, Section 16.5.*

**Do not repair or disassemble on site.**

**Replace faulty gas valves with genuine ROBERTS GORDON® replacement parts.**

### 13.6 Flue Fan

The flue fan should not require maintenance.

However, If the air pressure switch is causing burner lockout then remove the flue fan from the vent box.

See *Page 39, Section 16.4.* Ensure that the fan is free to run and that the fan wheel is clean.

## SECTION 14: CONVERSION BETWEEN GASES

### 14.1 General

Conversion between gasses will require a change of burner injectors and the gas valve re-commissioning to the new conditions.

### 14.2 Burner Conversion

Conversion of the burner assembly from one gas to the other is the same for all types of heaters.

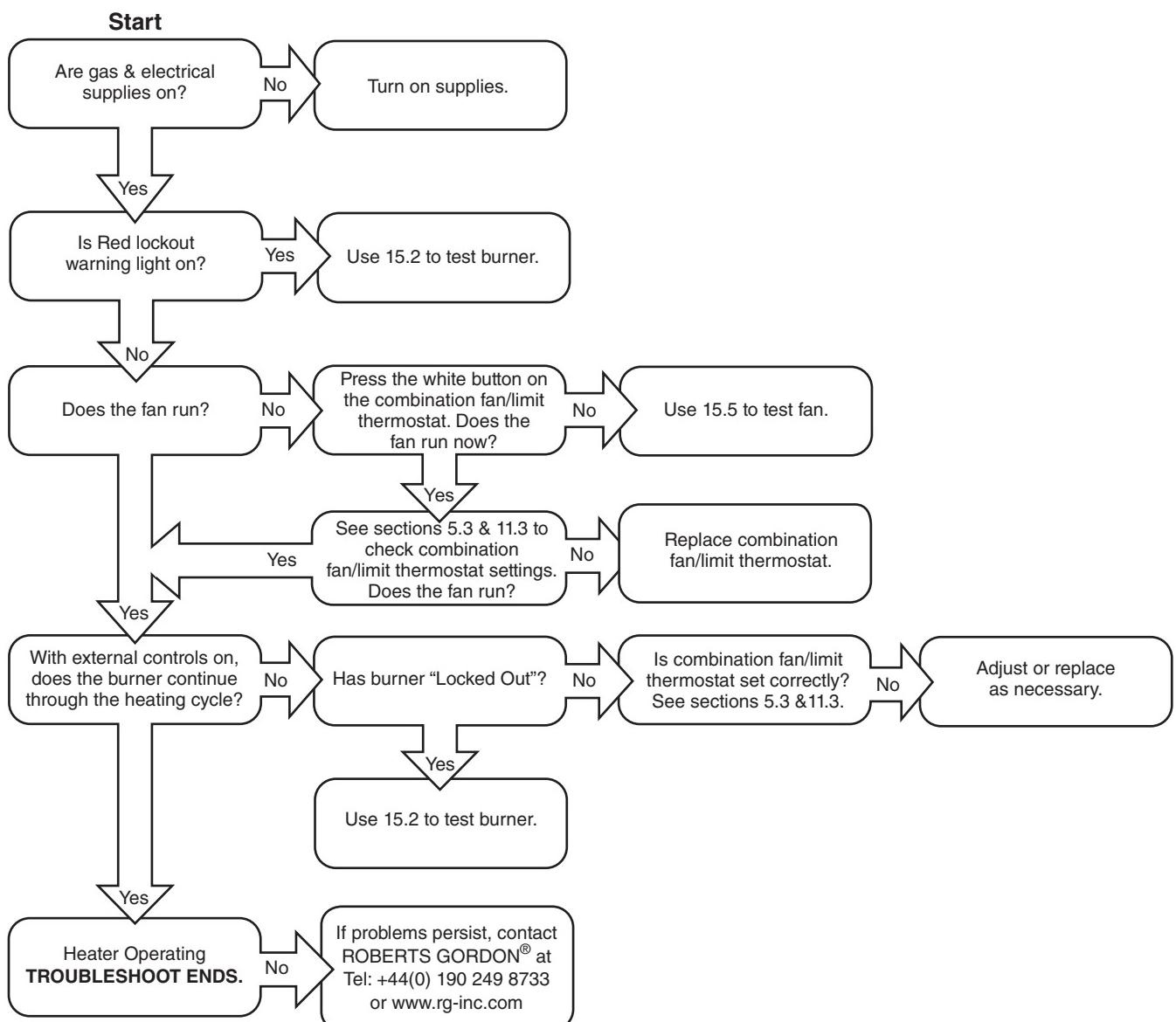
1. Remove the burner compartment cover as shown on *Page 37, Section 16.2*.
2. Remove the connection between the gas valve outlet and the manifold. See *Page 36, Section 16.1* for gas valve removal.
3. Remove the manifold from the burner assembly by removing the screws at the top and bottom. See *Page 37, Section 16.2.1*.
4. Remove the main burner injectors.
5. Replace with the injectors for the new gas ensuring a gas tight seal.
6. Refit all components in reverse order.

### 14.3 Gas Valves

All gas valves used on the DualAir® units have pressure regulators that may be set to operate on natural gas or LPG.

Conversion is carried out by re-setting the burner pressure to the value in the data table during commissioning. See *Page 7, Section 4.3*.

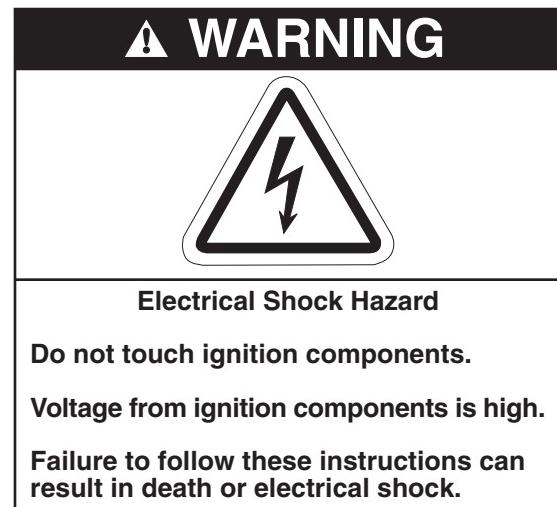
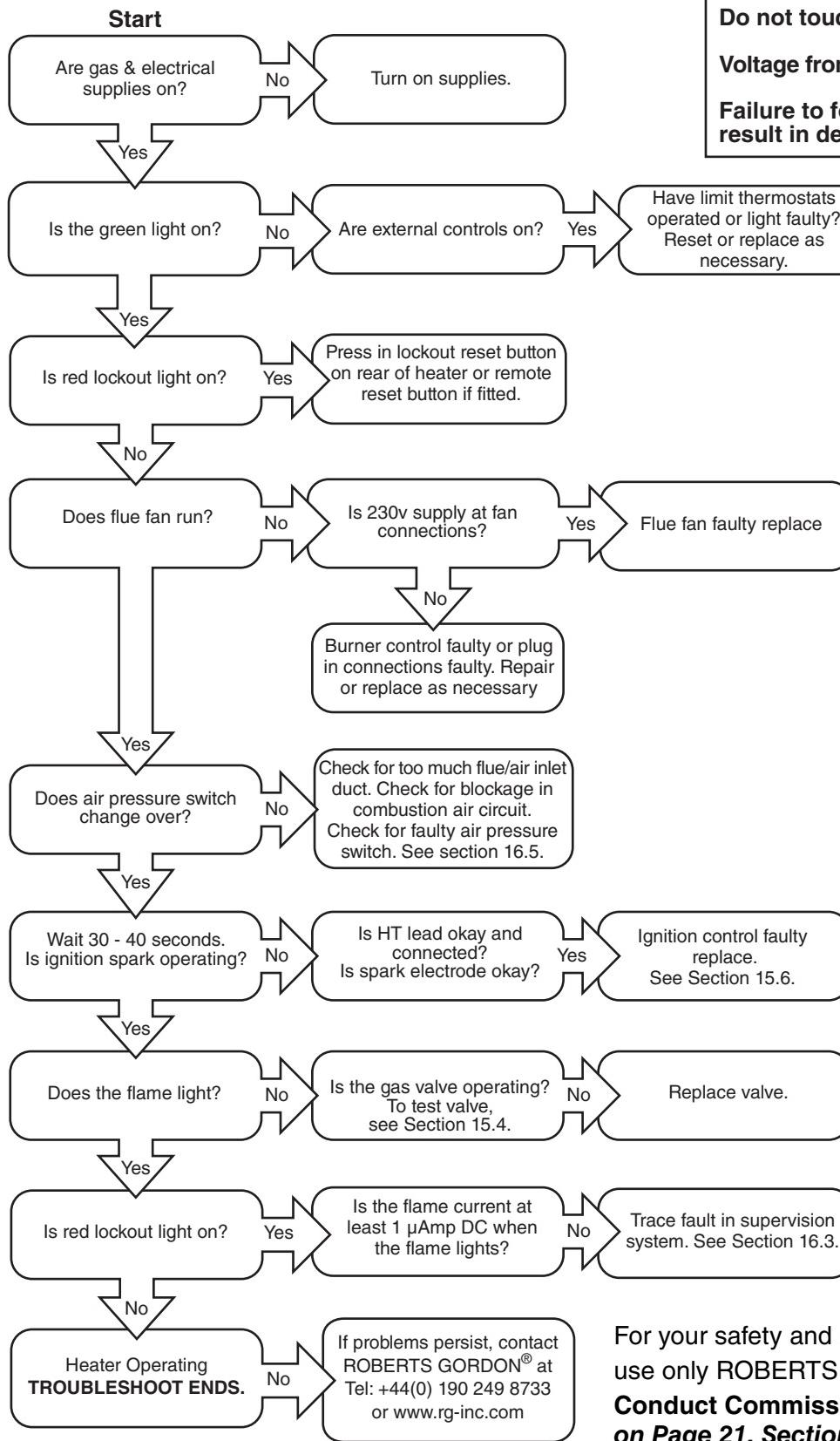
Ensure that the gas inlet pressure to the heater is correct for the new gas, and that the gas supply has been purged of the old gas.

**SECTION 15: TROUBLESHOOTING****15.1 General**

For your safety and optimum heater performance use only ROBERTS GORDON® replacement parts.  
**Conduct Commissioning procedure as shown on Page 21, Section 11**

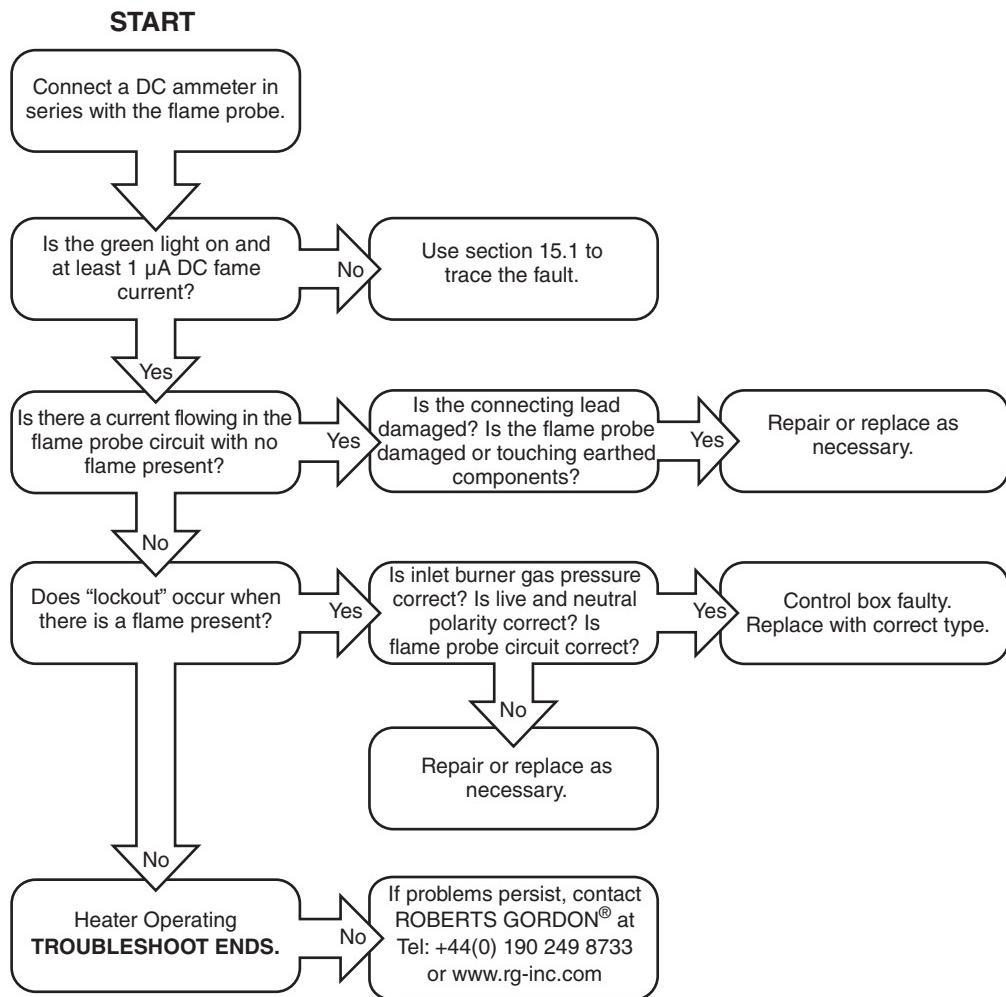
## 15.2 Troubleshooting For Automatic Ignition Burner Systems

There are two burner controls used. Honeywell S4563C and S4565C. They both have similar operating sequences. To measure flame current, connect a 0 - 50 µA DC meter in series with the flame probe. If the meter reads negative values, then reverse the test leads.



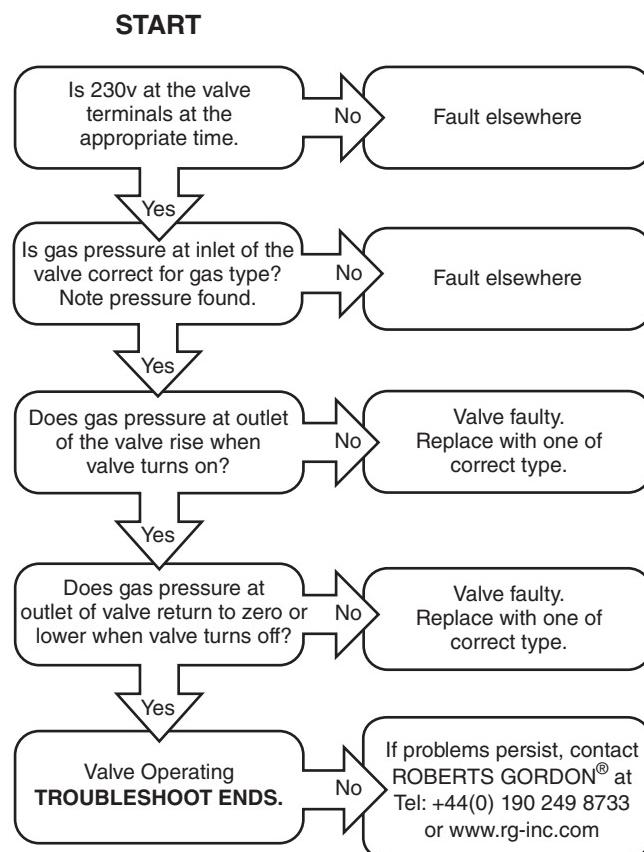
For your safety and optimum heater performance use only ROBERTS GORDON® replacement parts.  
**Conduct Commissioning procedure as shown on Page 21, Section 11**

### 15.3 Troubleshooting for Flame Supervision System

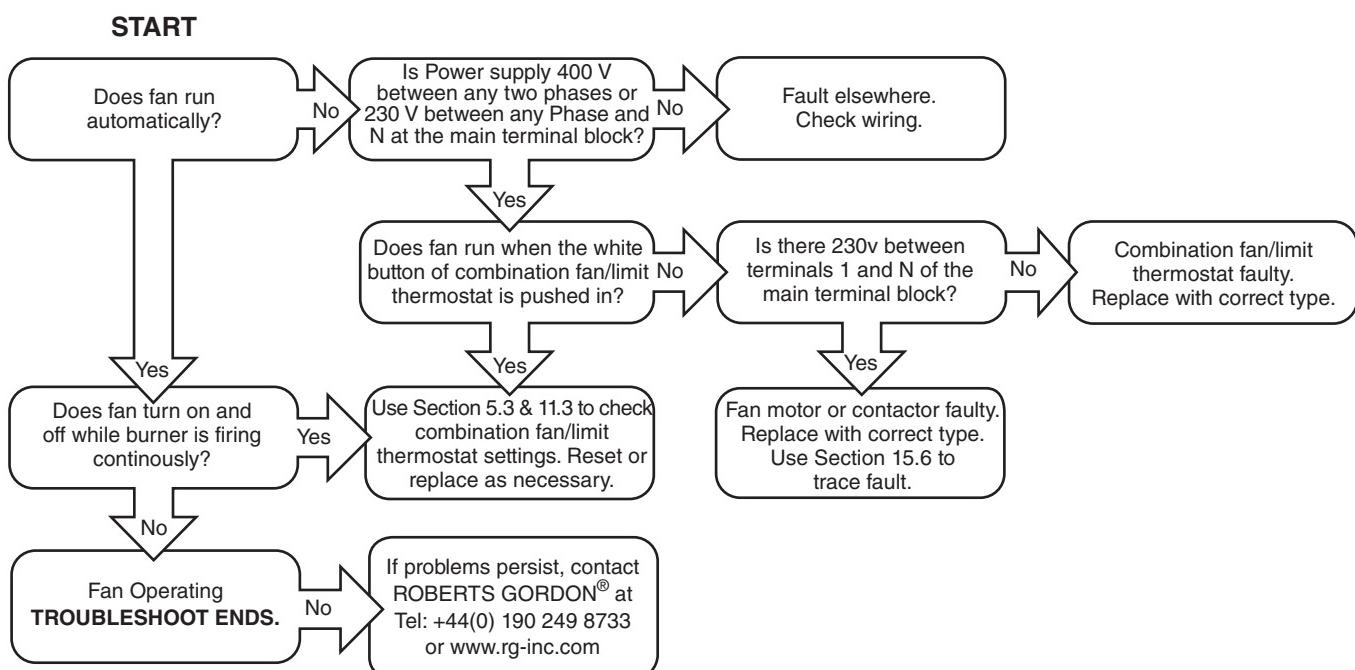


**NOTE:** Minimum flame probe current 1  $\mu\text{A}$  DC. Typical flame probe current 3-5  $\mu\text{A}$  DC.

## 15.4 Troubleshooting for Solenoid Valves

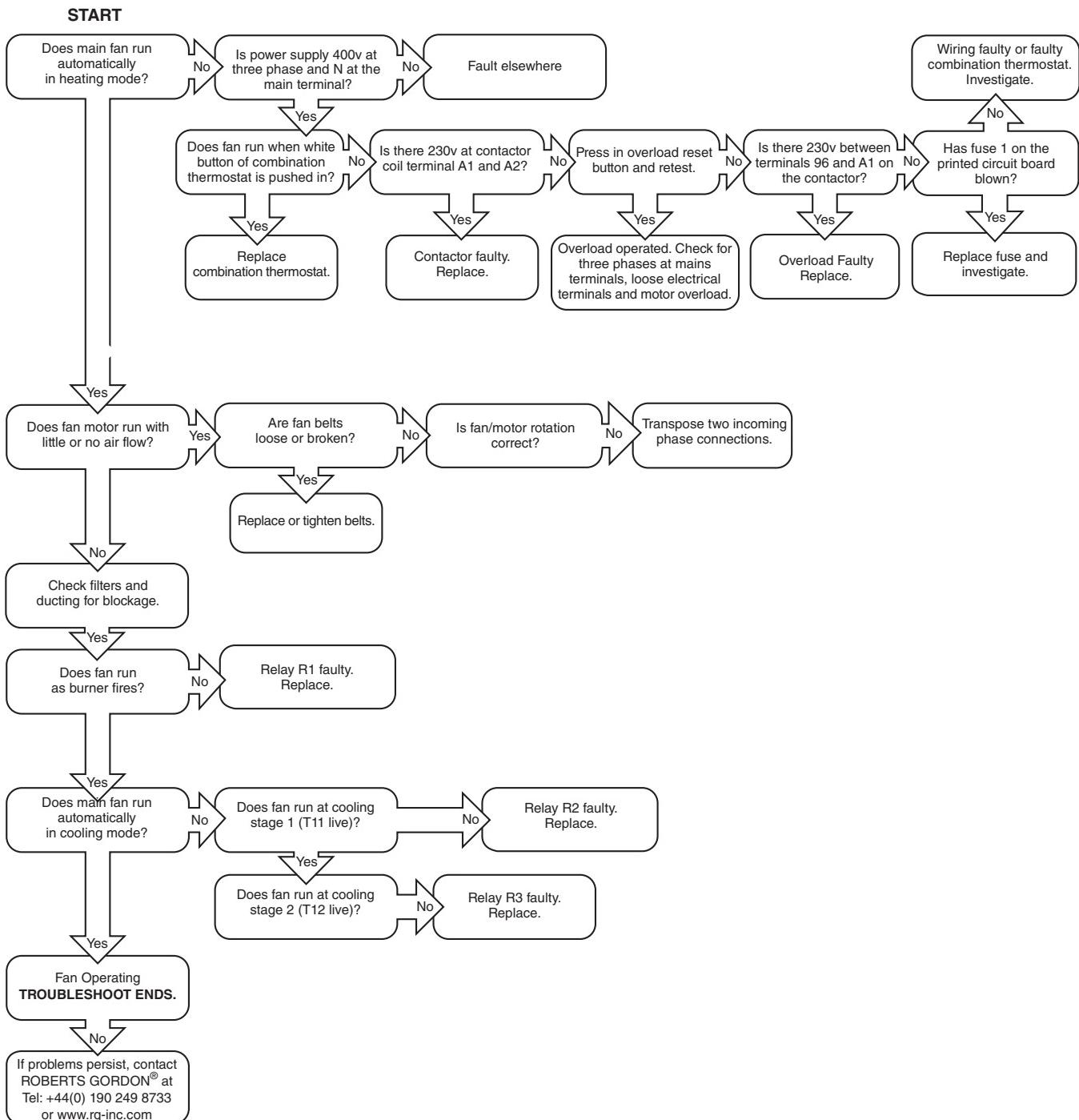


## 15.5 Troubleshooting for Main Fan



For your safety and optimum heater performance use only ROBERTS GORDON® replacement parts.  
**Conduct Commissioning procedure as shown on Page 21, Section 11**

## 15.6 Troubleshooting for Fan Contactor



For your safety and optimum heater performance use only ROBERTS GORDON® replacement parts.  
**Conduct Commissioning procedure as on Page 21. Section 11**

## SECTION 16: REMOVAL AND REPLACEMENT PARTS

See warnings and notes on *Page 28, Section 13* before removing or replacing parts.

### Burner Components

All serviceable burner parts are accessed by the door on the side of the heater.

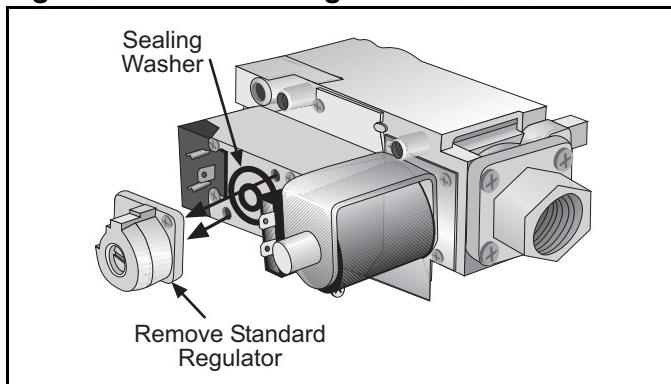
See *Page 5, Section 4*.

#### 16.1 Gas Valve

The VR4605 gas valve is fitted with the V7335A Modureg regulator (P/N L512) supplied as a separate component.

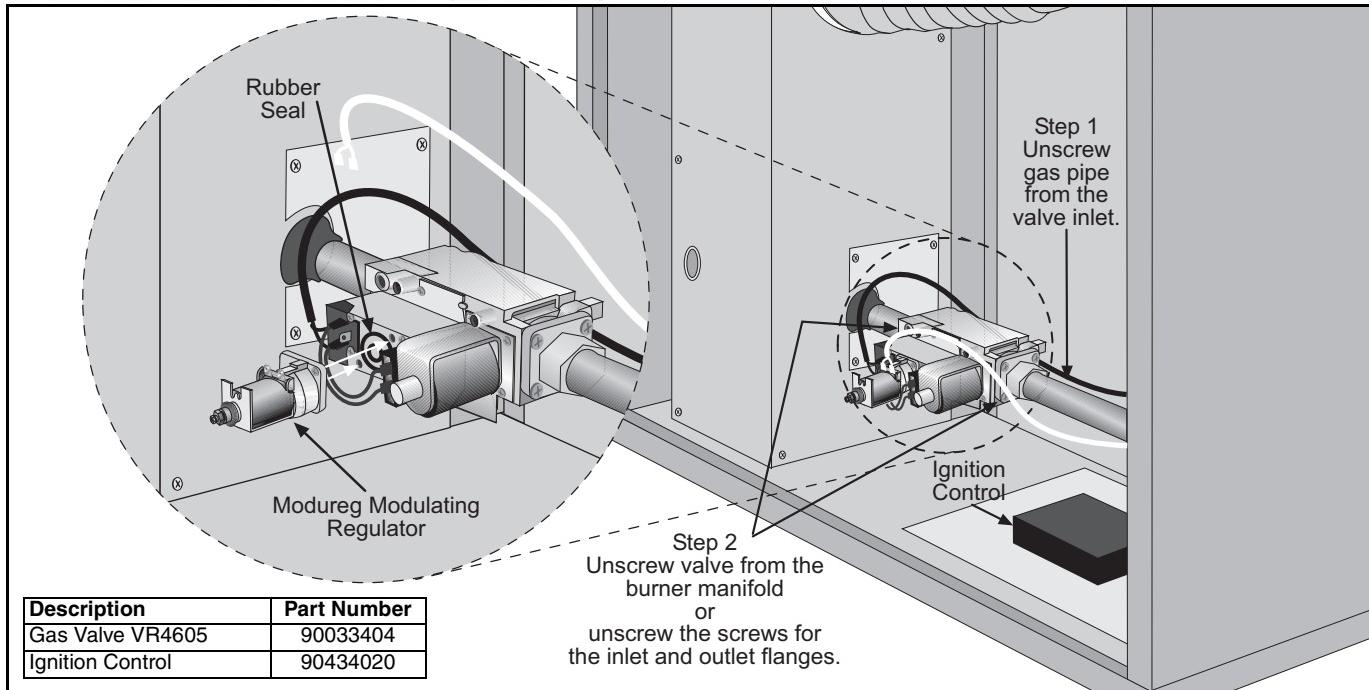
When replacing the gas valve, the Modureg will need to be fitted on site. To fit the Modureg, remove the standard regulator by removing the two screws retaining the rubber sealing washer. See *Page 36, Figure 17*

**Figure 17: Standard Regulator Removal**



Fit the Modureg ensuring that the rubber seal is in place and the two screws are tight. See *Page 36, Section 16.1.1*. Once fitted follow commissioning procedure in *Section 11*.

#### 16.1.1 Gas Valve Replacement - (all models)



#### 16.1.2 Gas Valve Replacement continued- (all models)

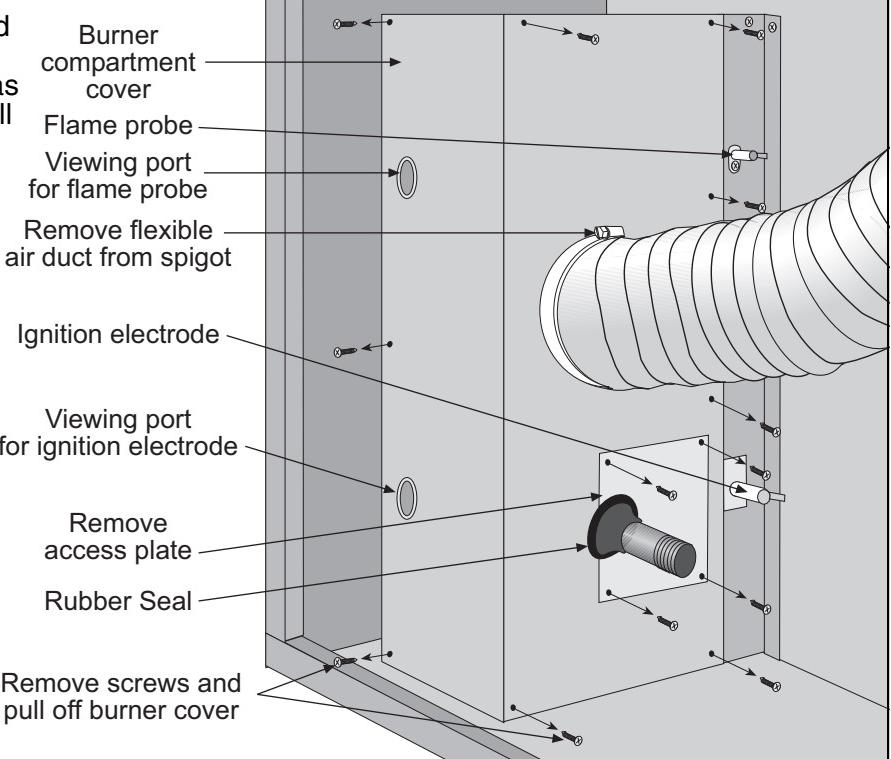
Replace in reverse order. Verify that the gas flow direction of the valve is correct. Re-use the "O" ring seal in the outlet flange where fitted. Check that all the joints are leak free. Reset gas valve.

See *Page 23, Section 11.4.2*.

**IT IS IMPORTANT THAT ONLY THE CORRECT GAS VALVES SPECIFIED FOR EACH MODEL TYPE ARE USED WHEN REPLACING THESE CONTROLS.**

## 16.2 Burner Compartment

The burner compartment is a sealed compartment. Following any work, re-seal the compartment with the gas pipe rubber seal fully in place and all screws fitted and tight.

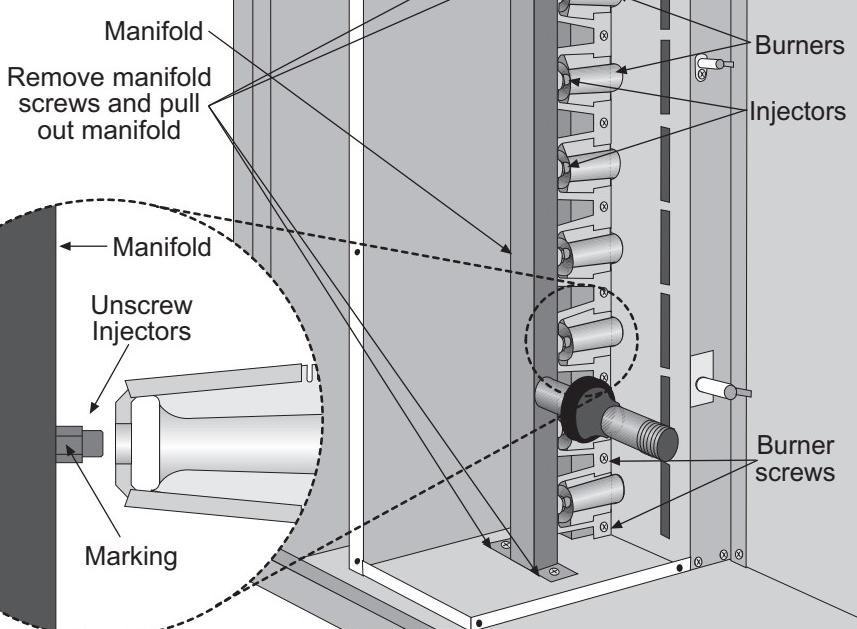


### 16.2.1 Burner Injectors

Ensure gas tight fitting of injectors.

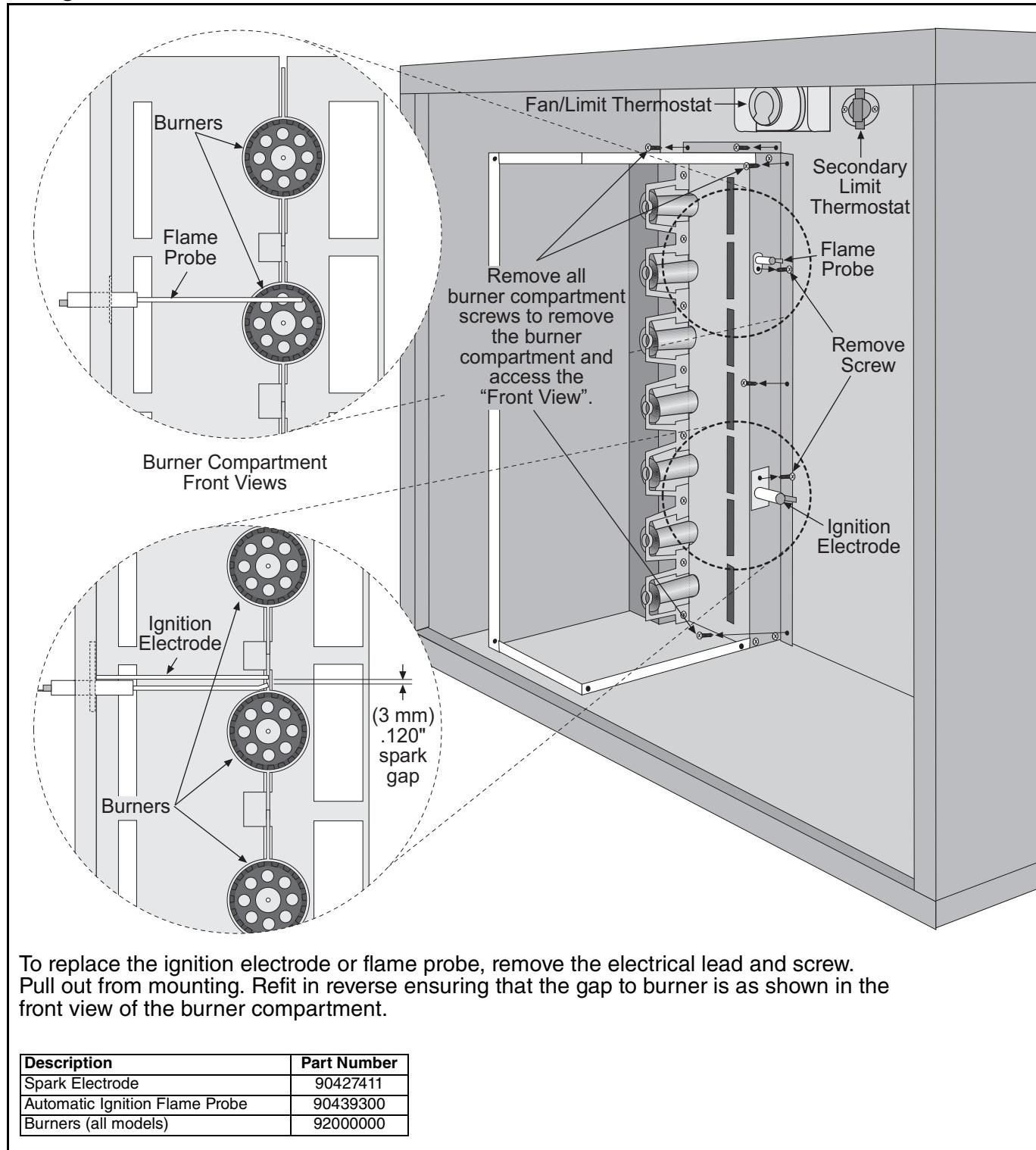
Ensure correct alignment with burners.

Ensure all pipe joints are gas tight.



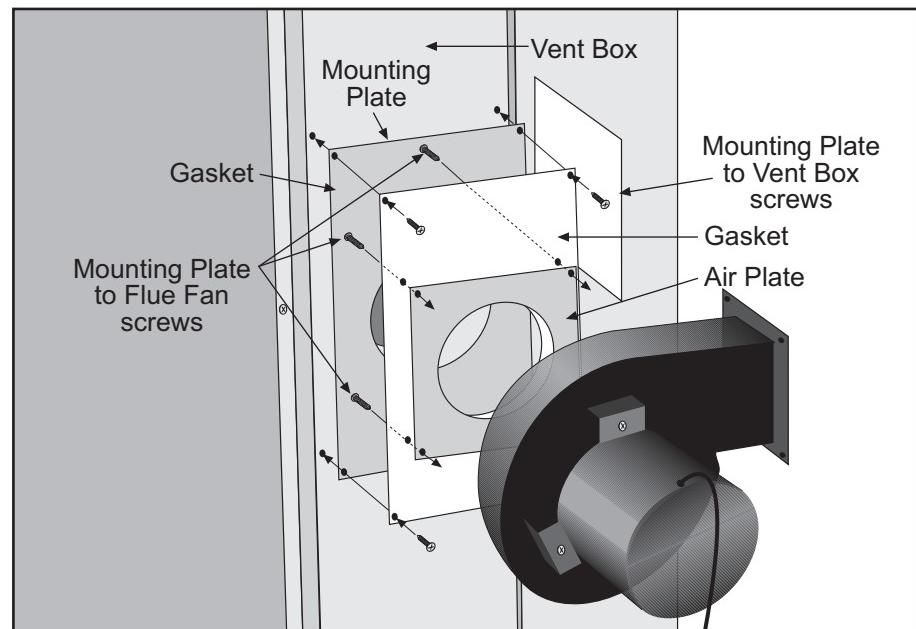
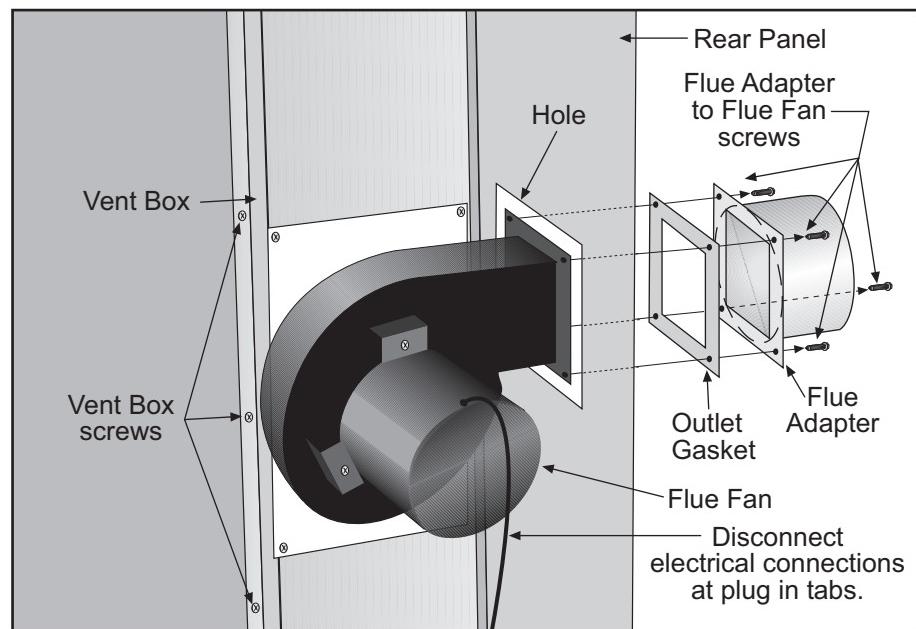
MODEL	75	90	100	115
Injector Quantity	12	14	15	17
<b>Natural Gas (G20) and (G25)</b>				
Injector Size	mm dia	2.71	2.71	2.71
	in dia	0.1067	0.1067	0.1067
Marking	36	36	36	36
RG P/N	91930036	91930036	91930036	91930036
<b>LPG Gas Propane (G31) and LPG Gas Butane (G30)</b>				
Injector Size	mm dia	1.51	1.51	1.51
	in dia	0.0594	0.0594	0.0594
Marking	53	53	53	53
RG P/N	91930053	91930053	91930053	91930053

### 16.3 Ignition Electrode and Flame Probe.



To replace the ignition electrode or flame probe, remove the electrical lead and screw. Pull out from mounting. Refit in reverse ensuring that the gap to burner is as shown in the front view of the burner compartment.

Description	Part Number
Spark Electrode	90427411
Automatic Ignition Flame Probe	90439300
Burners (all models)	92000000

**16.4 Flue Fan**

MODEL	75	90	100	115
Flue Fan	AO Smith JFIG07INS	AO Smith JFIG07INS	AO Smith JFIG07INS	Torin DSF 146-052 077274
RG P/N	90710001	90710001	90710001	90710450
Air Plate [mm dia] [in dia]	97.0 3.82	103.6 4.08	110.5 4.35	152.4 6
RG P/N	11011134	11011133	11011132	11011131

**IT IS IMPORTANT THAT ONLY THE CORRECT FLUE FAN SPECIFIED FOR EACH MODEL TYPE IS USED WHEN REPLACING THESE ITEMS.**

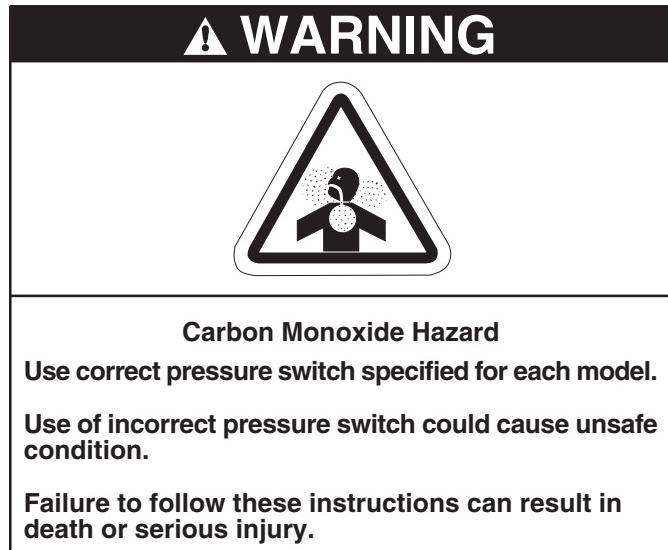
Carry out a commission after working on or changing a flue fan. See Page 25, Section 12.

## 16.5 Heater Pressure Switch

Pull off 3 way connector. Spring open plastic clips of mounting cradle. Replace with correct type of pressure switch for model. The pressure switches are colour coded for each pressure setting.

Carry out a commission after working on or changing a pressure switch.

See Page 21, Section 11.



Pressure Switch	75	90	100	115
RG P/N	90439811	90439807	90439811	90439807
Colour Code	grey	brown	grey	brown

## 16.6 Cooling Coil Safety Devices

### 16.6.1 Cooling Coil Frost Thermostat

The sensing element for this device is inserted into the pocket of the cooling coil situated through the access hole in the coil cover.

The frost thermostat has two settings marked as set point with an arrow head and "diff". The control should be set at 5°C with a 1°C differential.

To replace, remove screw and pull off knob.  
Remove cover. Disconnect wires.  
Pull the sensing element out of the pocket in the coil.  
Replace in reverse order.

### 16.6.2 Pressure Switches

The coil and dirty filter pressure switches are preset and different. They are differential pressure switches measuring the pressure loss across the coil or filter.

#### Coil Pressure Switch

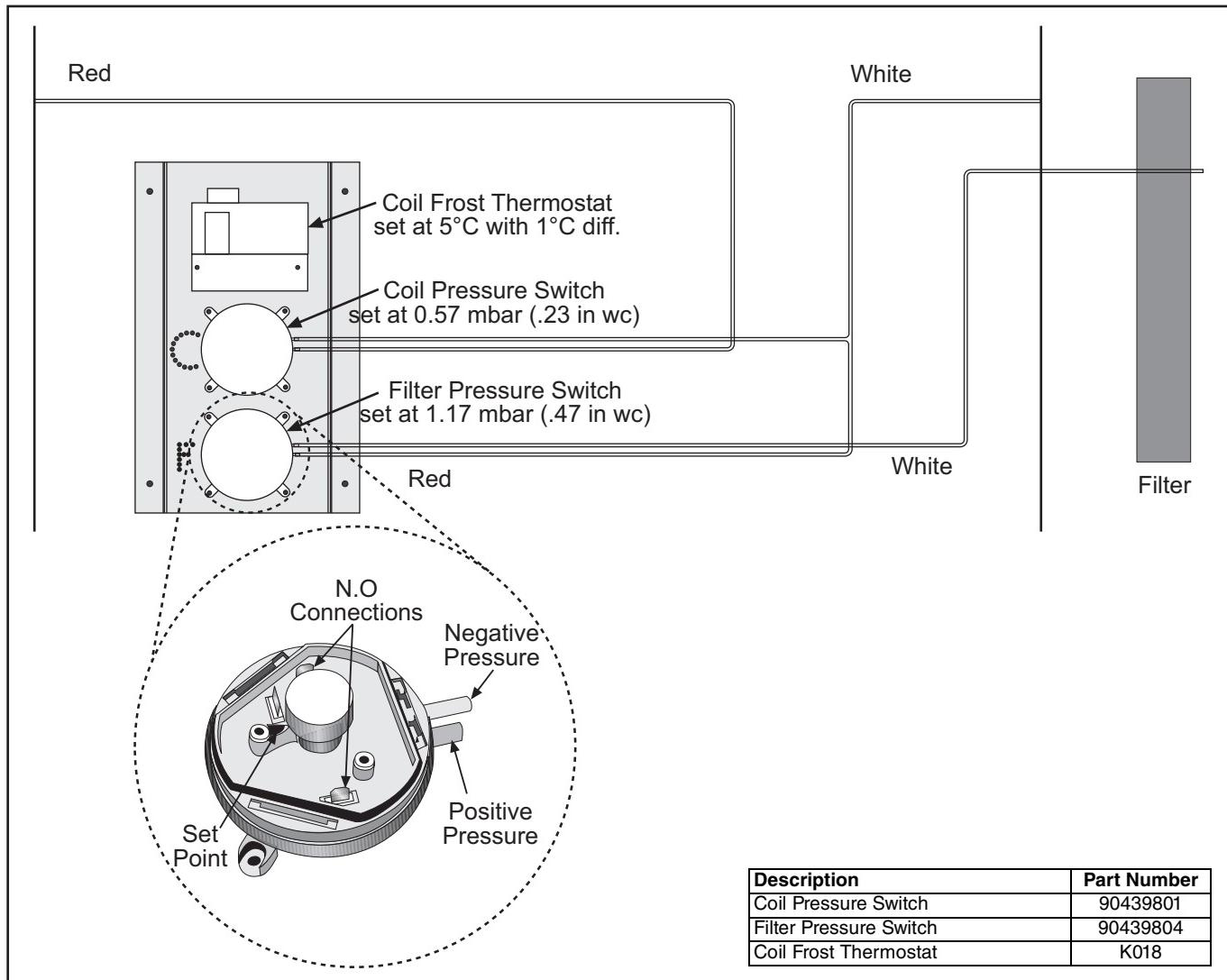
(Normally open contact) used to prove adequate air flow for safe operation of cooling coil.

#### Filter Pressure Switch

(Normally open contact) used to give indication of filter becoming blocked.

To replace, remove coil compartment cover.  
Disconnect wires noting their position. Remove the flexible tubing noting the position of the tube connection. Replace in reverse order and check operation.

**Figure 18: Cooling Coil Safety Devices.**



## 16.7 Ignition Control

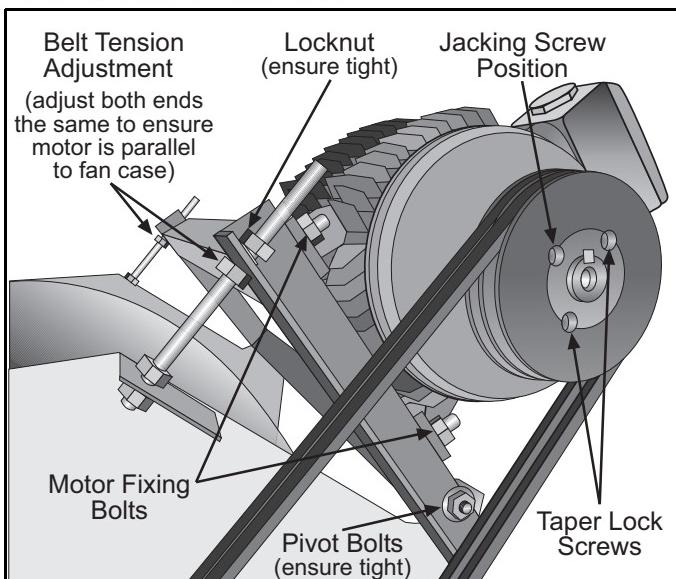
**IT IS IMPORTANT THAT ONLY THE CORRECT IGNITION CONTROL SPECIFIED FOR EACH MODEL TYPE IS USED WHEN REPLACING THESE ITEMS.**

### 16.7.1 S4563C

This control is mounted at the electrical mounting plate. Pull out the 3 cable connectors.

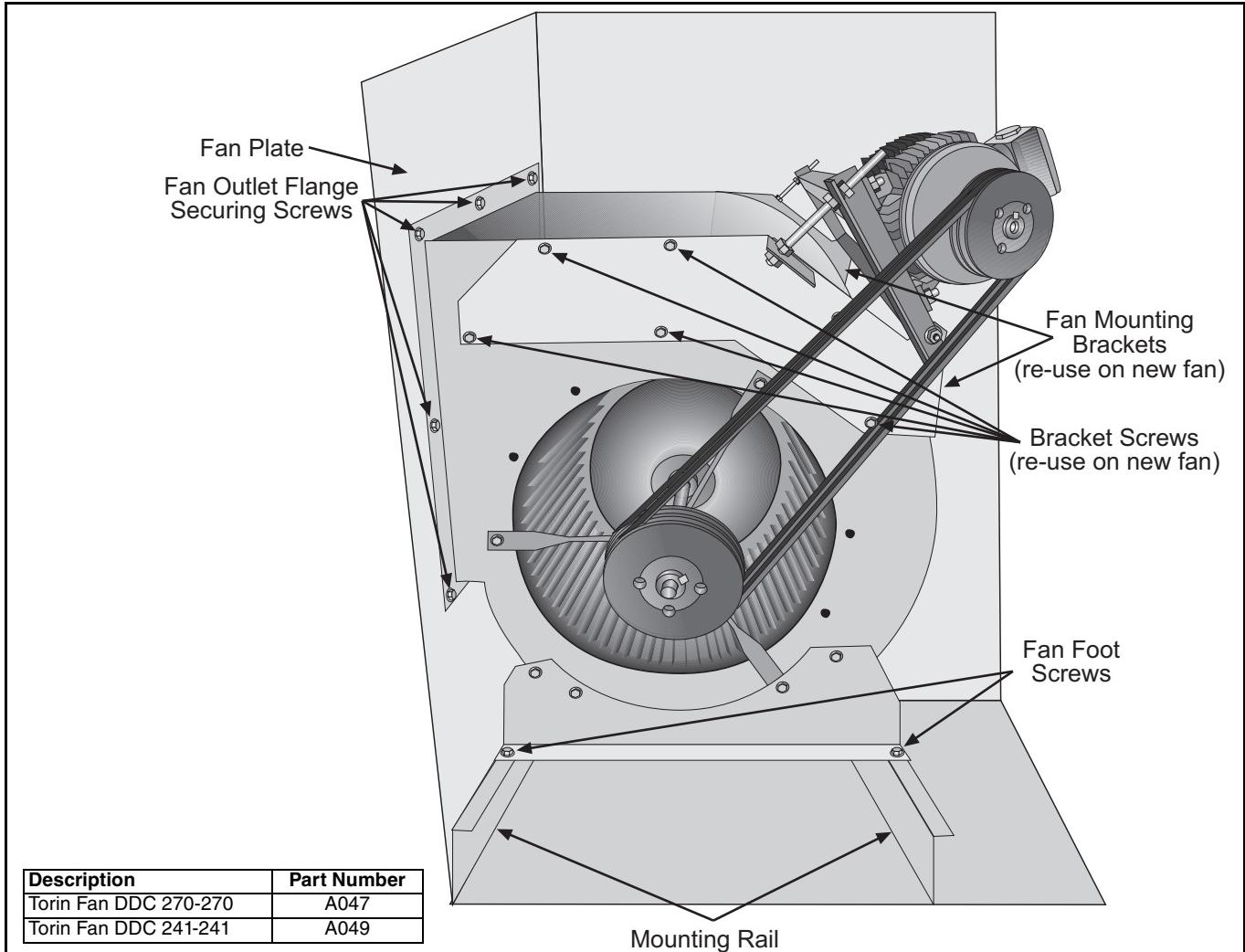
Pull out ignition cable, ignition earth and flame probe cable noting their positions. Remove the screws. Refit in reverse. Ensure correct location of ignition and flame probe cables.

## 16.8 Fan Motor Removal



1. Disconnect the electrical connections at the contactor and pull the cable back to the fan motor.
2. Slacken the belt tensioning nuts and remove the drive belts.
3. Unscrew the motor mounting bolt.  
(motor is heavy, may need two people)
4. Remove the motor pulley by using a hexagonal key to remove the taper lock screws. Use one of these screws to fit into the centre jacking screw and tighten into this position to separate the taper lock bush and the pulley.
5. Replace in reverse order.  
Use a straight edge to ensure both pulleys line up. Ensure the pulley fixing screws are tight and belt tension is correct (use new belts if required). Ensure motor rotation is correct.

### 16.8.1 Fan Removal and Replacement



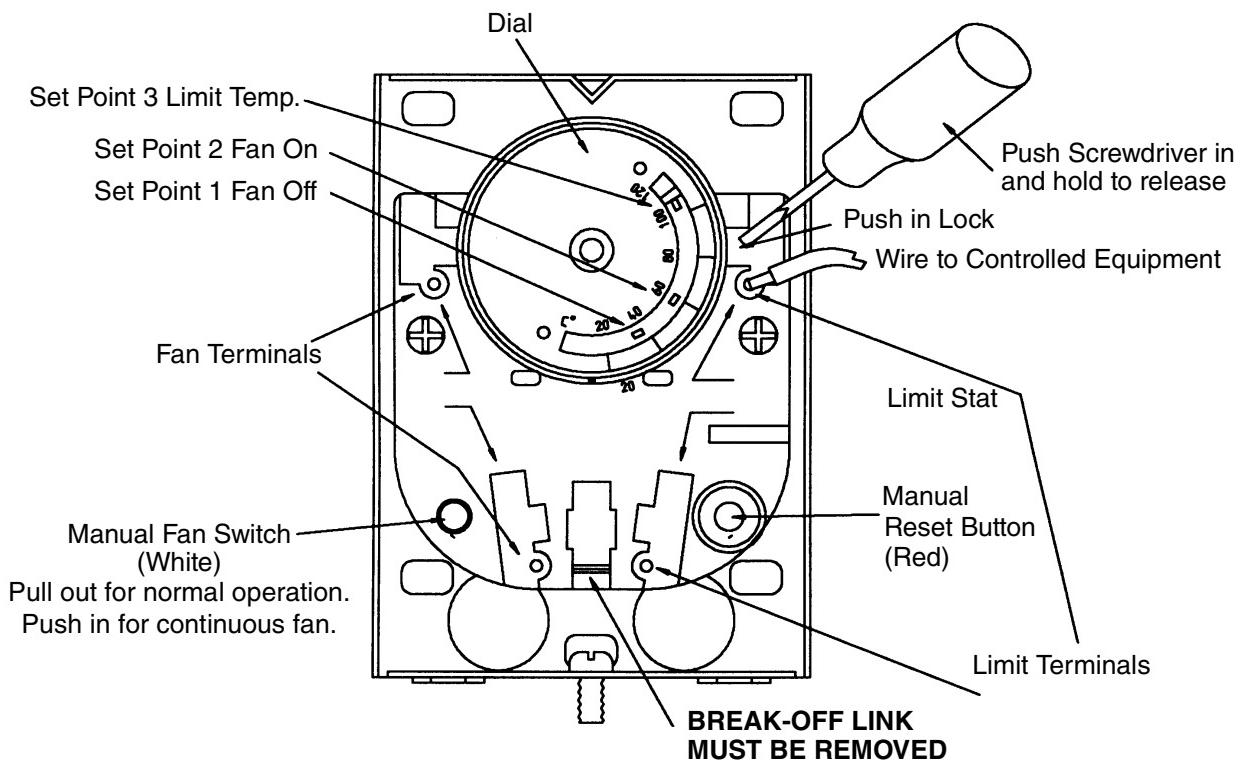
1. Remove motor leaving the pulley in place.  
See Page 42, Section 16.8.
2. Remove screws securing the fan outlet flange to the fan panel. (captive nuts)
3. Remove nuts and bolts securing the fan feet to the mounting brackets.
4. Slide the fan out.  
(fan is heavy, may need two people)
5. Remove the fan mounting brackets from the fan. Retain components to fit to new fan.
6. Remove the fan pulley by using a hexagonal key to remove the taper lock screws. Use one of these screws to fit into the centre jacking screw and tighten into this position to separate the taper lock bush and the pulley.
7. Refit the components above to the new fan and refit in reverse order.
8. Check belt alignment and tension.
9. Check fan rotation is correct.

### 16.9 Combination Fan/Limit Thermostat

#### 16.9.1 Removal and Replacement

1. Remove wires.
2. Remove the mounting screws.

Figure 19: Combination Fan/Limit Thermostat





Attach this information to the wall near the ROBERTS GORDON® heater.



**ROBERTS GORDON®**

Read the installation, Commissioning, Operation and Service Manual thoroughly before installation, operation or service.

#### OPERATING INSTRUCTIONS

1. STOP! Read all safety instructions on this information sheet.
2. Open the manual gas valve in the heater supply line.
3. Turn on electric power to the heater.
4. Set the thermostat to desired setting (above ambient temperature).  
The automatic starting sequence begins.

**NOTE:** Following long shutdown periods, the burner control may go to 'LOCKOUT' during the start sequence. Push the reset button to recommence firing. Contact service department if 'LOCKOUT' continues (see manual for details).

#### TO TURN OFF THE HEATER

1. Turn the thermostat/time switch to 'OFF'. The burner will turn 'OFF' immediately, but fans will continue to cool heat exchanger until the fan thermostat switches off.

#### IF THE HEATER WILL NOT OPERATE, TO ENSURE YOUR SAFETY, FOLLOW THESE INSTRUCTIONS TO SHUT DOWN YOUR HEATER

1. Set the thermostat to off or the lowest setting.
2. Turn off electric power to the heater.
3. Turn off the manual gas valve in the heater supply line.
4. Call your registered installer/contractor qualified in the installation and service of gas-fired heating equipment.

#### ! WARNING



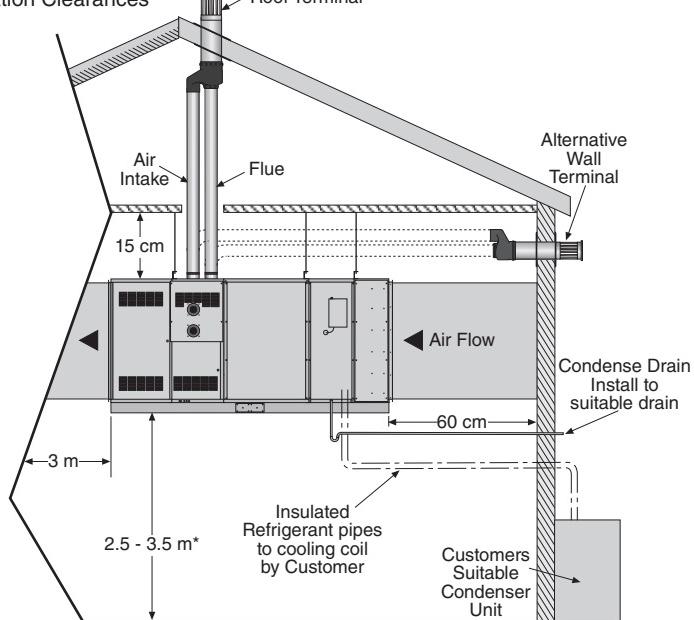
##### Fire Hazard

Some objects can catch fire or explode when placed close to heater.

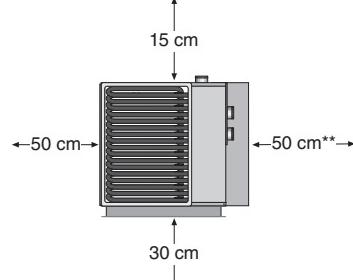
Keep all flammable objects, liquids and vapors the required clearances to combustibles away from heater.

Failure to follow these instructions can result in death, injury or property damage.

#### Installation Clearances



#### Clearances to Combustibles



\*\*80 cm is necessary to service heater.

**Roberts-Gordon Europe Limited**  
Unit A, Kings Hill Business Park  
Darlaston Road, Wednesbury  
West Midlands WS10 7SH UK  
Telephone: +44 (0)121 506 7700

Fax: +44 (0)121 506 7701  
Service Telephone: +44 (0)121 506 7709  
Service Fax: +44 (0)121 506 7702  
E-mail: uksales@rg-inc.com  
E-mail: export@rg-inc.com

**Roberts-Gordon, LLC**  
1250 William Street  
P.O. Box 44  
Buffalo, NY 14240-0044 USA

Telephone: 716.852.4400  
Fax: 716.852.0854  
Toll Free: 800.828.7450

**Installation Code and Annual Inspections:** All installations and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor annually inspect your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

For installations at elevations above 2000' (610 m), the appliance shall be derated 4% for each 1000' (305 m) of elevation above sea level.

**Further Information:** Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through ROBERTS GORDON® representatives.

Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

This products are not for residential use.

© 2007 Roberts-Gordon, LLC All rights reserved. No part of this work covered by the copyrights herein may be reproduced or copied in any form or by any means – graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems – without written permission of Roberts-Gordon.

www.rg-inc.com

Printed in U.S.A

P/N 91040089